# Principles of Modern Physical Education, Health, and Recreation

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# Preface

Our purpose in writing this book has been to provide for students planning careers in health, physical education, or recreation an introduction both to the scientific core of information about human physical activity and health-related behavior and to the philosophy, procedures, and purposes that we consider relevant for professional experience in the disciplines these students have elected to follow. We have wanted our book to serve the needs of teachers and students who are seriously involved with the very foundations of health, physical education, and recreation.

In preparing the text and assembling its supporting data and demonstrations we have been mindful of the changes occurring in education as the result of world-wide social and political turmoil, changes that have affected the professions of physical education, health education, and recreation just as profoundly as they have all other aspects of modern life.

Like all of today's college students, majors in physical education, health, and recreation reflect the strengthening of academic standards throughout the school system. They also exhibit the increased sophistication characteristic of earlier physical and social maturity. Although the complexities of modern life have multiplied the pressures placed upon them, there is little doubt that young people are better prepared than ever before to cope with the problems left to them by preceeding generations.

Today's students come to college not only academically well grounded, but also philosophically committed to idealistic goals. It is now up to the colleges and universities to give these eager young recruits the modern weapons and training they will need if they are to be successful in attacking the crucial problems they will have to face. It is increasingly clear that their success (and the survival of their professions) depends upon their ability to establish themselves in the minds of the public as *knowledgeable experts* in matters of human physical activity and health-related information and behavior.

We believe that if students are to develop an adequate expertise in their profession, they must first develop a healthy self-respect based upon pride in their *potential* professional contribution. The fostering of this desirable self-image can best be facilitated through early exposure to the true *substance* of the profession. In expressing this philosophy, we have wanted:

1. To introduce the student to his chosen profession by indicating not only what his profession is, but also what it can become.
2. To provide a practical handbook of important principles and a useful source of documented information for the use of the student throughout his preparatory training as well as for the graduate on the job.
3. To establish an integrating element that could function to help the student perceive the relationships among the many courses he will encounter during his professional training.

As a means of organizing some of the ideas contained in this book we have utilized two terms borrowed from the field of neurology. The expression EFFERENT CONCEPTS has been used to identify those ideas dealing with the effects that physical activity and health-related behavior have upon man's biological function, his social conduct, his philosophy, his art, and his culture in general. Conversely, AFFERENT CONCEPTS refer to those ideas that are concerned with how man's physical makeup, his environment, his philosophy, and his culture act to influence, modify, or direct human physical activity and health-related behavior.

As a further attempt to aid students in understanding the material presented, an extensive glossary is included. As each technical term is introduced it appears in boldface, indicating that a definition can be found in the glossary.

So as to distinguish the present effort from the earlier book entitled *Physical Education: A Problem-Solving Approach to Health and Fitness* (Holt, Rinehart and Winston, Inc., 1966), which resulted from a collaboration

with our colleagues Donald Stolberg and Maryellen Schaefer, we should like to emphasize that the 1966 work was written as a text for a new type of combined health and physical education course, one directed more specifically to students not concentrating professionally in health, physical education, and recreation. It was inspired by the idea that today's more mature, intelligent college student deserves to be given the opportunity to study and evaluate for himself the available evidence concerning human physical activity and behavior related to health and fitness.

Many people agreed that this kind of information is valuable for the general student but pointed out that it is of even greater importance for the student preparing to work professionally in health, physical education, and recreation. The obvious objection to the use of the first book for majors has been, however, that it is addressed to a different audience and fails to consider several topics of particular importance to professional students.

Thus, in this book, which is designed for majors, we have deliberately retained significant portions of the scientific content from the 1966 volume and even expanded them considerably into the fabric of the preponderance of new material making up the present text.

We would like to express our appreciation to the many fine people on our own faculty and to those at other institutions who have contributed so much to the genesis of the ideas expressed in this book. Dr. Donald Stolberg has been a particularly stimulating co-worker, and many of his ideas have found their way into this text. We are grateful to several other dedicated professionals whose imaginative work with the introductory majors' course at the University of Toledo has contributed in many ways to our writing of this book. Dr. Harriett Williams, Dr. John Drowatzky, Dr. Jack Schendel, Dr. John Burt, Dr. Jan Broekhoff, and George Gilmore have all made valuable contributions to the philosophy and content of our program at this level.

Our thanks are also extended to Dr. Marguerite Clifton of Purdue University, Dr. Marvin Eyler of the University of Maryland, and Dr. John Cooper of Indiana University, whose many sound criticisms and suggestions for changes in our manuscript have contributed to its substantial improvement.

To Dan Wheeler, of Holt, Rinehart and Winston, we express our appreciation for his enthusiastic encouragement and knowledgeable advice. We would also like to thank Jeanette Ninas Johnson for her advice, patience, and very real assistance in putting this book together.

Finally, we are grateful to our wives, June Updyke and Ann Johnson, for their loyal support, encouragement, and frequent unselfish assistance in this undertaking.

W. F. U
P. B. J

*Toledo, Ohio*
*October 1969*

# Contents

# Introduction

Times are changing rapidly. The ever increasing complexity of society demands that we expand our understanding of man and his world if we hope to survive as individuals and as civilized nations. At the same time that pleas for increased breadth of knowledge are being raised, there arises an insistence upon increased professional and technical specialization. The beleaguered student is caught in the middle.

Today's college student, whatever his major field of interest, is expected to master facts and concepts that will give him far greater expertise upon graduation than has been possessed by preceding generations. In becoming an expert, however, the student has found it impossible to pursue as wide a variety of interests as once was possible.

Few people would deny that physical education, health education, and recreational leadership have become distinct and separate professional specialties. There is simply too much of a specialized nature within each field to expect one individual to become adequately prepared in more than one of them in four years. Recognition of this fact has led to the establishment of separate curricula for the preparation of professional workers in each of these areas.

It is not surprising to discover that these curricula contain certain very important common elements, since the three professions share several of the same important objectives. All three professions, for example, are directly concerned with helping man to understand himself and his biological and psychosocial needs. All three are devoted to fostering habits and techniques that will serve not only to help preserve man's health but also to enable him to achieve a full, satisfying life.

The purpose of this book is to provide students with a summary of concepts and principles important to health educators, physical educators, and recreation leaders alike. This is not meant to imply, however, that every concept and principle discussed in the text is considered equally important to each of the professions. Neither is it assumed that all important concepts and principles have been covered, or that judgments made concerning the placement of emphasis are infallible.

We do believe that each chapter in some way provides a substantial portion of the general foundation that must undergird the more specific knowledge and skills of persons embarking on a career in health, physical education, or recreation, and that there is no concept or principle presented that does not hold significance for at least one (if not all) of these professions.

Chapter 17 (Concepts Underlying Special Programs) provides an example of material that is not of equal concern to recreation specialists, to health educators, and to physical educators. While only members of the latter group would be expected to become actively involved in physical activity programs for the atypical child in school, health educators must certainly be aware of the need for such programs and should be intimately concerned with fostering sound philosophies of physical education and recreation for atypical persons as an integral part of the total health education program. Recreation leaders will be increasingly called upon by communities to provide facilities and programs for handicapped youngsters and adults; knowledge of appropriate opportunities, as well as understanding of the limitations imposed by various conditions is essential to the provision of meaningful programs.

Other examples of mutual concern are provided in the brief sections dealing with diseases and disorders of the various systems, and those related to exercise concepts. In the case of diseases and disorders, awareness of these matters may be of pratical significance to the practicing physical educator and recreation specialist even though knowledge of such disorders may be of more direct concern to the health educator. In the second instance (exercise concepts), physical educators will regard concepts pertaining to physical activity as being of paramount importance. The potential health benefits and dangers of various kinds of exercise and physical activity will also be of more than passing interest to the health educator. The recreation leader will make considerable use of such infor-

mation in planning sound, effective programs to meet the leisure needs of the community.

As a summary of principles and a review of important concepts, it is apparent that this book is intended to go beyond serving as an introduction to the professions involved. It is hoped that as you progress through your academic programs, its pages will provide practical assistance in the development of projects and that its many references will serve to give initial direction in the search for further information for papers and presentations. When you near completion of your training, we hope this book will assist you in integrating the detailed and widely divergent aspects of your preparation. And as you begin your professional career, you will find it useful as a review of pertinent ideas and important professional responsibilities and objectives.

Because it is meant to be more than an introductory text, we have included brief sections dealing with procedures and programs. The chapters in Part IV (for example, Essential Emergency Procedures, and Selected Issues) are intended to provide some exposure to these less conceptual but nonetheless basic concerns of the true professional.

It is hoped that this book and the philosophy out of which it has developed will help to identify and strengthen the common goals of physical education, health education, and recreation leadership in order that through their separate, unique contributions these professions may fully achieve their potential for the improvement of man and society.


THE BLADE, TOLEDO, OHIO
Rewarding Experience
Alcindor Working With Underprivileged Youngsters

# *PART I*

# Essential Backgrounds

# The Prospective Professional

## Chapter 1

### VITAL QUESTIONS

"Why am I here?" "Why have I chosen a career in physical education—or health—or recreation?" These are questions that each person should ask himself early in his educational career.

There are, of course, any number of possible answers to such questions. However, the nature of these answers may be of vital importance to you and to your profession as well.

Some categories into which typical answers fall are:

1. The desire to pursue personal interests and aspirations; to do something one enjoys.
2. The desire to influence the behavior of others; to achieve acclaim or status.
3. The desire to be of service to others who need assistance.

It is obvious that one's motives might involve all of these desires. It is equally possible, however, that a given individual might enter a profession primarily motivated by one of them. It is conceivable, for example, that one might choose to become

LEW ALCINDOR
*Finds youth stimulating*

# Rewarding Experience

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## Alcindor Working With Underprivileged Youngsters

NEW YORK (AP)—Lew Alcindor, who could now be getting ready to lead the U S. basketball team in the Olympics, is working instead with the underprivileged youngsters of New York.

"I don't know of anything I've done yet that's been more rewarding," he says "We know what we've done has worked. It's been that good. It's wonderful."

This is the same man who not long ago said of his decision not to try out for the Olympic basketball team:

"We have a racist nation and my decision not to go for the Olympics is my way of getting the message across."

Alcindor, the 7-foot plus center of UCLA's **collegiate** champions and already considered one of the greatest of modern basketball players, was a cinch to make the Olympic team.

He is now part of Operation Sports Rescue along with other famous athletes. Teams each headed by an athlete talk to youngsters in small groups.

"Young people idolize athletes," says LeRoy Wilkins, director of the project. "If you can get athletes to say the same thing that religious leaders and educators are saying, they'll listen."

The objectives of Operation Sports Rescue are to instill self-pride in youngsters of the street, to impress on them the value of remaining in school, to underscore the value of independence by acquiring marketable skills, and to encourage youngsters to take an active part in community affairs.

**Among the athletes working on the project in addition to Alcindor are Emmette Bryant of the Boston Celtics, Ron Blye of the New York Giants, Tom Hoover of the Houston Mavericks, Bobby Hunter of the Harlem Globetrotters, Carlos Ortiz and Jose Torres, the boxers, Oscar Robertson of the Cincinnati Royals, and Walt Bellamy of the New York Knicks.**

"Alcindor has worked almost as much as all the rest put together," said one of the project officials.

Operation Sports Rescue is sponsored by the Mayor's Urban Task Force and financed by the Bristol Myers Co

**FIGURE 1.1** As they become mature, most great athletes become interested in identifying with a "cause" that is greater than self. (Copyright AP; photo, World Wide Photos.)

a health educator because he loves biology or immunology. A love of history might lead another to become a history teacher. A successful high school athlete might choose to enter physical education because he loves sports competition.

The question is, have we chosen this profession because we wish to prolong pleasant experiences in our own lives, or is it that we wish to extend to others the benefits of enjoying for themselves the kinds of experiences we have found meaningful and pleasurable?

Maturity brings changes in philosophy and objectives. It has been said of the typical athlete that when he is young, he wants to be *good*; as he grows older, he wants to be good for *something*. This increasing awareness of the influence that he can have on others through his athletic achievements can lead him in many different directions. Figure 1.1 illustrates the fact that many people who have achieved athletic fame find even greater rewards in forgoing the pursuit of further public acclaim in favor of giving of themselves to others who really need help.

It is doubtful that maturity can be gained by any means other than personal experience. Therefore, the only real justification for pointing out the matters discussed in this chapter is that responsible decisions (if and when they are made) depend upon the avail-

ability of accurate information. On the other hand, if one is to really profit from his educational experiences, he must approach them with a sense of perspective that makes the various courses take on meaning.

At the very beginning of a career it is important to have a serious talk with oneself. It is important to make some definite decisions now (painful though the process may be) about what your real goals in life are. In making these decisions you are really spelling out your philosophy of life. Do you wish to serve others or to be served? Are you anxious to become a coach or teacher or recreation leader in order to be in a strong position to exert an influence in the lives of youngsters, or does this kind of life appeal to you because of the opportunity it gives you to stay in the environment you love? Steinhaus has said that the person who is interested in getting the most dollars does not have the instincts of a teacher (543, p. 256). This does not mean the teacher should not expect fair remuneration for his expensive training and important work. It does mean that if his goal is the gathering of material goods, he does not really have the capacity for putting other people's welfare ahead of his own.

At this point it should be pointed out that no good coach or teacher is entirely unselfish in his motivation. Of course he is fond of the subject he is teaching. Of course he loves the excitement of hard fought contests. But he recognizes that these experiences must be directed toward meeting the needs of the youngsters rather than meeting his own needs. In other words, the truly *professional* person recognizes that his primary responsibility is the improvement and nurture of the student; the


FIGURE 1.2 "Maybe I ought to become a surgeon . . I've always enjoyed cutting and stitching"

professional's own enjoyment and even his professional advancement must be secondary considerations. And certainly neither his enjoyment nor his advancement are ever to be attained at the expense of his students.

In learning to subjugate one's own selfish interests to the best interests of others, many people have found unexpected rewards. No one would deny the thrill to be gained from putting a team of talented performers together and guiding them step by step to victory. Even more gratifying, however, can be the experience of developing the capacity to analyze the subtleties in complex performance and then to creatively utilize this knowledge in producing performers when there were apparently no performers. Anyone can slavishly initiate the systems of others, but what could be more soul satisfying than being the originator of a concept, system, or idea? Anyone should be able to win with good material, but what can be said of the man who can win with players who began as only mediocre performers? And what of the person who uses his influence to expand the creative imagination of an "ordinary" child? That man has the qualities of a *teacher*!

As soon as one begins to direct his thinking in terms of his profession as a service to others, it becomes obvious that the number of youngsters he can help is much larger than he may have realized. Although interscholastic athletics can directly involve a few elite performers, all of the students in a school system profit from a well-conceived program of physical education. Because the life of a normal child is intimately bound up with physical activity, physical educators, recreation leaders, and health educators take advantage of every opportunity to utilize natural urges and desires in achieving a variety of worthwhile educational objectives. However, this must not be understood to mean that such objectives will automatically be achieved. We will have a great deal to say later on about the necessity for careful planning and preparation, if *any* of the potentially valuable outcomes of physical education, health, and recreation are to be realized.

## INTERRELATIONSHIPS OF THE PROFESSIONS

To someone who has thought of physical education only in terms of the opportunities it provides for the teaching of motor skills and coaching, it may not be clear what physical education has in common with health education or recreation education. On the other hand, if it is recognized that regular physical activity of appropriate kinds has a profound effect on the physical welfare of all people in terms of growth and development and on the prevention of certain degenerative diseases, it becomes obvious that the positive health of people ("preventive medicine") is a common objective of both physical education and health education. Furthermore, the kinds of activities we engage in during our leisure hours, the types

of diversions we pursue as a means of maintaining our sanity in times of stress, are mutual concerns of all three professional areas. Certainly all three are ultimately concerned with the well-being (physical, mental, and spiritual) of the individual. The means utilized in the attainment of these lofty objectives may vary considerably, and the place within the community where these objectives are sought may also be different. But to the extent that all three are concerned with frequent use and knowledge of physical activity in meeting the physical, mental, and spiritual needs of human beings, they are related.

It is also important to recognize that because of the fact that physical education, health education, and recreation are all concerned with the effects of their programs on man's welfare, they all require training and background in the physical and psychological makeup of man.

Certainly it would be foolish to presume that there are no major differences in the three programs under discussion. Although there may be even greater differences developing as changes occur in our society, there are still sufficient similarities to justify a common core of early training experiences. For this reason it is assumed that the readers of this book will represent all three professional areas, and it is hoped that even though illustrations and examples may be taken from one or another particular field, it will be realized that the principles involved are intended for physical educators, health educators, and recreation specialists alike.

## THE QUESTION OF "MEANING"

After Hillary first conquered the terrifying heights of Mount Everest, he was asked why he would take such terrible risks and subject himself and others to such hardships in order to reach the top of a mountain peak. His famous response of "Because it is there!" seems, somehow, unsatisfactory. To most of us, sports, games, and other vigorous activities are *means* to the achievement of some goal rather than *ends* in themselves. Sometimes our actual purposes or goals may not be clear even to ourselves, but generally we can identify some motive for our actions such as the physical challenge involved, love of competition, desire to excel, better health, fitness needs, or, simply, the pleasure derived from success.

Because it is possible to derive different kinds of outcomes from a given activity, it becomes necessary for the educator to decide what specific outcomes he wishes to produce. How does one go about deciding what his specific aims are? Or should one simply provide instruction in the desired skills and give people the opportunity to participate and let *them* worry about the outcomes of this kind of behavior?

In physical education, for example, there are teachers who have no desire to get involved in the questions of "meaning" in physical activity. Their only concern is to teach people *how* to perform certain activities. The development of skill is their ultimate and only objective. Whether or not the learner continues to utilize the skills, whether

he derives any social, psychological, or physiological benefits, or whether he understands that there may be some such benefits are of no concern to this individual.

On the other hand, there are teachers who are deeply concerned about the values that students may be developing through participation. These teachers spend considerable time and effort in organizing their instruction so that skill development is accompanied by the acquisition of physical fitness. They strive to be certain that students understand the benefits and limitations of specific activities in terms of fitness and other factors. These teachers are concerned with the function of physical education in the total educational picture. These two types of teachers (those concerned with "meaning" and those not) are representative of two divergent philosophical viewpoints that characterize not only physical education but also health education and recreation.

## TECHNICIAN OR PROFESSIONAL?

To view the physical educator, health educator, or recreation leader as a technician means that he deals primarily with techniques. There is no implication that the *quality* of his work is inferior. There are excellent technicians and there are poor technicians; their distinguishing characteristic is that the *scope* of their activity is comparatively narrow. The technician's responsibilities are limited to the actual implementation of a program. He *administers* the activities that are set up by someone else. In some cases he may actually select the activities in his program, but this selection is based on the fact that they are being used by someone else. In short, the technician is concerned only with the practical matters of getting the program across to the students. He is not really concerned with *why* particular activities are presented at a certain level in the curriculum. The *theoretical* aspects of the function of his profession are neither his concern nor his responsibility. Someone else makes the decisions about what is "good."

The philosophical considerations and analytical processes that go into determining *why* the technician is teaching what he is teaching are the hallmarks of the professional. He must have the depth and breadth of knowledge to understand the needs of people and the means by which these needs can best be satisfied. He must be able to critically evaluate the effects of his program and make appropriate revisions. His *number one* characteristic is capacity for critical thought and analysis. He must be able to answer the question "Why?"

It is probably true that some people are more suited to the role of the technician than to that of the professional, and vice versa. It is apparent, for example, that most athletic coaches are technicians. How many different offensive formations or systems are in use in football today? Presently, the I formation (in which three backfield men line up directly behind the center and in which the fourth splits out to one side or the other as a potential pass receiver) is coming to the peak of its popularity. A few years ago nearly every

team in the country was using something called the split T. Prior to that we had the T formation that "revolutionized football." The old single wing is now nearly forgotten, and many players today have no idea how it would operate. Yet there was a time when it was considered the ultimate weapon of the game. (Similar "band wagon" phenomena could be identified in health education and recreation.)

Why do these changes occur? Do they just happen by coincidence? Is it a kind of spontaneous combustion? Or is there someone, somewhere, who has carefully studied the structure of the game and has analyzed, on a theoretical basis, the effects of certain kinds of action?

Why is there such widespread adoption of certain systems, to the exclusion of almost all others? Is it because the newest is the best? Could it be that when a famous college or professional coach is successful with a particular system, others rush to its adoption simply because he is successful with it? Are such innovations studied carefully with respect to the ability, size, or maturity of the players who are expected to execute them?

The coach who is a true professional fully understands the capabilities and limitations of his players and *creates* or *adopts* a system to fit these criteria. In order to create something new he must, of course, have some understanding of mechanisms, psychology, and even human anatomy and physiology. (Effective blocking technique, for example, is dependent upon factors in each of these categories.) Of course, the mere *possession* of a storehouse of knowledge is not enough. The ability to *use* this knowledge in unique ways is essential if one is to be a true professional in any career. Creativity and the ability to think critically are indispensable assets.

The question now becomes, should physical educators, health educators, and recreation leaders be expected to function primarily as technicians or primarily as professionals? Is there room for both? If so, how does one decide which to become? And if one decides to become an excellent technician (as a teacher of skills, for example) what assurance does he have that after a few years he will not wish to move into a position requiring the background and training of the professional?

Some schools have attempted to solve this problem by training at least all majors as potential professionals. Other schools have been content to concentrate on techniques and skills, assuming that most teachers and leaders will be functioning at the technical level.

Other professions have recognized a need to provide separate training programs for technicians and professionals. Medicine, for example, has the curriculum for the M.D. as well as the medical technician. Each is thoroughly trained in his field, but there is no expectation that the technician will ever be interested in assuming the responsibilities of the "professional." At the same time it is also assumed that the technician will be highly proficient through excellent training and diligent practice of his particular specialty. In other words, the assumption is that the jobs of the physician and the medical technician are *different*, requiring dif-


FIGURE 1.3 Examples of the "bandwagon" effect of certain attributes that often seem to gain uncritical approval because "everybody's doing it": (A) health movies, (B) jogging, (C) isometric exercise, (D) steam bathing.

ferent kinds of people. Neither job can be adequately performed without the conscientious dedication of the person involved. Although the physician's training requires greater depth and diversity of study (and therefore more time), that of the medical technician requires mastery of intricate procedures and techniques, many of which require constant practice for the maintenance of proficiency. In many cases these are techniques that physicians are never taught. They must rely on the skill and know-how of the technician to supply them with reliable information on the patient. It is obvious that an incorrect diagnosis due to either faulty judgment or unreliable information could be disastrous to the patient.

Thus, medicine has learned to handle many of its rapidly growing problems by a division of labor. A relatively few people are educated in the theoretical "whys and wherefores" requiring ex-


(C)


(D)

tensive background upon which understanding and judgment can be built. A great many people are recruited for training in the important, time-consuming laboratory tasks required in today's medical practice. The physician, with his theoretical knowledge, can then decide what procedures are necessary and can direct certain treatments that are then carried out by those who are primarily trained in the intricacies of the techniques involved.

There are signs that public education is following the lead of medicine. The preparation of the subject-matter *specialist* is being advocated; such specialists would act as "master teachers" and would determine what is to be taught and the sequence in which educational experiences would appear. The responsibility for determining what the "patient" needs and in what doses the prescription is to be administered would belong to the master teacher.

He would be the planner and coordinator. Teachers with less background but with very specialized training would complete the team. These team teachers would then be responsible for implementing the courses; that is, they would do the actual teaching.

This pattern, or modifications based on the team teaching principle, has been proposed for physical education and health education as well. The problem of what training the master teachers should have as compared with that required of the other team members has not been solved.

It is at this point that the medical analogy breaks down. In medicine the professional, with his mastery of physiological and pathological considerations, has been carrying the load for years. It is only recently that the technician has come onto the scene to aid him in doing a better job for society.

In physical education the *reverse* is true. For many years the vast majority of physical educators have been trained as technicians. They have been trained in the physical performance of skills and in techniques of teaching others how to perform the skills. But where is the professional who can provide the "diagnosis" of what skills students need and at what age and in what sequence? Where is the professional who can state, with authority based upon unimpeachable fact or logic, which of the benefits claimed for physical education are fact and which are myths or old wives' tales?

Only very recently have our universities turned their attention to the preparation of experts in study of human movement in all of its specialized ramifications. Only recently have programs sprung up for the education of specialists in the fields of exercise physiology, community health problems, consumer health, recreation and aging, psychology of motor learning, sociology of physical activity, recreation for the handicapped, philosophy of physical education, and other related subjects.

The rapid development of the attitude that we need to have experts to study and understand the "whys" of physical activity has caused considerable controversy within the profession. There has not been universal agreement as to exactly what the major objectives of physical education should be.

## SUMMARY

It is important for the student in health or physical education or recreation to closely analyze his motives for choosing his prospective profession. While curiosity about or *personal* interest in a subject may be sufficient reason for embarking upon some careers (astronomy, engineering, computer programming, automobile racing, and so on), success as an *educator* must be based upon an interest in people, not as objects to be studied or used, but as human beings to be helped. Such a focus of interest demands no less scholarship, however, than a more selfish approach. But it does modify the uses to which scholarly knowledge is applied.

While the three fields of physical education, health education, and recreation are distinct entities, they do have

*ally and socially fit citizens through the medium of physical activities which have been selected with a view to realizing these outcomes (79, p. 40).*

Eight years later Bucher's definition had not changed substantially, but several pages were devoted to the development of an appropriate understanding of education in general.

*. . . when you add the word* physical *to* education *you are referring to the process of education that goes on when activities that develop and maintain the human body are concerned (80, p. 17).*

Such views differ little from that presented by Hetherington over fifty years ago. He defined *education* as a lifelong process in which the individual's powers were developed "and adjusted to a social order for complete living." He equated physical education with fundamental education and suggested that it provided the basis for all the rest of education (176, p. 115).

In 1910 T. D. Wood and Clark Hetherington began writing about "the new physical education" as a broadening experience in the lives of students. Wood concluded that "physical education should occupy itself with a program of activities which would foster physical health, but they should be considered as by-products while the pupil was being guided toward the acquisition of mental, moral, or social benefits" (176, p. 115).

Despite some widespread insistence upon narrowing the objectives of physical education to those of "preparedness" during and following World War I, the focus of physical education during the first half of the twentieth century was on the broad contributions that could be made to the development of good citizenship. As wartime emergencies and cold-war pressures persisted, the fitness objective periodically waxed and waned in prominence, but "there is little doubt that the idea of physical education as a contribution to 'education for complete living' has been the dominant theme of the field since the early years of the twentieth century" (176, p. 122). Physical education proclaimed its value in terms of the contributions it could make to the "total education" of the individual "through the physical." As a specific medium of education, it could (and did) claim widely diversified objectives accumulated from the procession of educational theories that have influenced education since 1900.

One of the great difficulties encountered in trying to state the nature of the profession lies in the nature of the term *physical education* itself. One of the great early spokesmen for physical education, Jay B. Nash, has said that the word *physical* is a misnomer because it implies that there is some sort of inherent conflict between physical and mental activity (418). The idea of "educating the physical" has long been dismissed because it is self-contradictory. Still persisting, however, is much of the original confusion that has always accompanied the use of this term. Nearly thirty-five years after Nash's time, despite suggestions by many leaders that the name of the profession be changed to reduce confusion,

the old problem is still with us. In 1967 Janet Felshin wrote: "The name itself is unfortunate, of course, because it explains nothing. We know—unless we wish to deny overwhelming evidence to the contrary and claim a dualism of mind and body—that the 'physical' cannot be educated, and even if it could be, as programs of physical education have long seemed to suppose, what would such an education mean?" Felshin goes on to point out that a true discipline must be defined in terms of its unique subject matter.

*Physical education has been explained not as the "study of . . ." but as the "teaching of . . . ," which has resulted in the paradox of an academic discipline in colleges that is defined by curriculum in schools (176, p. 140).*

No one would seriously suggest that by merely changing the name of our profession could any of these problems be solved. On the contrary, the changing of the name would merely be a reflection of the changes in the concepts of physical education that are presently occurring.

If we are to survive as an effective, contributing, educational agency, we must accept the obligation to become experts in the unique subject matter of our profession: *human physical activity* in all of its ramifications and implications. The current emphasis is on determining logical boundaries for the discipline. Although agreement has not yet been reached on details, it seems evident that our profession is moving rapidly toward defining its overall concern in terms of "man in motion." Thus, the study of man as a *moving* being becomes the focus of the profession, and all aspects of human movement become the unique domain of its members. The physiological effects of physical activity (or lack of it), the sociologicial implications of sports and games, the mechanical efficiency of motor skills, the psychological effects of participation, as well as the esthetic aspects of movement as represented by the dance (but not limited to dance) would all be legitimate parts of the discipline. Study would be devoted not only to the effects of movement (or exercise) on the life and welfare of the individual but also to the effects that the various forms of movement activity have on his surroundings and his culture.

It should be evident that in this system the educational aspects of human movement (including the preparation of teachers, skill instruction, and coaching) would be only a part of the profession's concern. Study of the movement-related phenomena for their own sake, regardless of any practical applications, would be a legitimate pursuit of scholars. Conceivably, some people would find positions in industry, the arts, government, and other environments on the basis of their expertise in exercise or movement.

## NATURE OF HEALTH EDUCATION

The term *health education*, in contrast to *physical education*, enjoys much greater universality of definition. The term *health* is itself more broadly conceived now than formerly. Instead of the old

negative concept of "freedom from disease and infirmity," it now carries a positive connotation: good health is a "state of complete physical, mental and social well-being" (500). Thus *health education* is defined as "the process of providing learning experiences which favorably influence understandings, attitudes and conduct in regard to individual and community health" (410, p. 7).

Health education is typically viewed as part of a more diverse school health program that also includes health services to pupils and a program of healthful school living. In small schools, especially elementary schools, there is usually no health education specialist, and all three phases of school health are distributed among the teachers and administrators. There is usually no school nurse, and health appraisal is limited to yearly hearing and vision testing by a visiting school nurse or some other trained person. Larger schools, especially high schools, are more likely to provide a resident school nurse who is responsible for most of the services such as referral, caring for sickness and injury while at school, appraisal, and so on. Such a specialist is also usually responsible for evaluating and upgrading healthful school living, often in cooperation with the health educator. Apparently, more large secondary schools are providing full-time health education teachers, even though a recent survey shows that there are still few health teachers who are strictly full-time; only about 7 percent of all health teachers for grades 9 through 12 are full-time in health education (500).

Although, in one recent study, over 50 percent of all "large" schools sampled in grades 9 through 12 offered a separate health education class, only 25 percent required health education for all grades 9 through 12. These percentages are slightly different for medium-sized and small schools. Interestingly enough, more medium-sized school systems required health instruction (37.5 percent) than did large schools, and small schools were very similar to large ones in this respect (24.9 percent) (500). All too often the health educator's "other" responsibility is coaching. Experience has shown that this is often not the best combination of responsibilities, and it is usually the health education that has suffered. The professional health associations are concertedly attempting to change this situation. There is little question that well-trained, full-time health educators are needed to carry out most effectively the objectives of the new health education.

Health education cannot be handled by a technician. It is multidisciplinary in nature. Its content is "derived from medicine, public health, and the physical, biological and social sciences" (500). It covers diverse areas from the nature of disease to marriage and parenthood. Modern health education methodology draws from the behavioral sciences. The nature of today's health education is such that programs must be implemented and conducted by well-trained professionals, not part-time or, for that matter, full-time teachers who are trained only as technicians (see pages 12–16).

In summary, health education is:

1. Multidisciplinary in nature
2. Dynamic (growing and improving) in nature

## THE NATURE OF RECREATION

"The most dangerous threat hanging over American society is the threat of leisure . . . " (161, p. 390). "The darkest threat to the well-being of the working man and the subject of increasing concern on the part of organized labor" is the burden of leisure (161, p. 390).

These grim statements from responsible leaders leave little doubt about the urgency of preparing Americans to cope with leisure. The problem of leisure in American life is intimately bound up with our consideration of recreation. This is not to imply that leisure and recreation are the same thing but to imply that it is difficult to consider recreation in any setting that does not involve leisure.

### DEFINITIONS

There is no universal agreement about the definition of leisure. It has been claimed that no real definition can be given. One of the problems is that the term is used to describe a block of available time, a feeling about obligations or lack of them, a tool for social control, an opportunity for self-improvement, or as a part of a work-rest dichotomy. It has been stated that the term should really be a verb, "to leisure," implying that some kind of a conscious process is going on (4).

The traditional definitions of leisure regard it as a block of time. This time is distinct from that spent in work or preparing for work. Even this concept, however, has its problems.

*Work is something to fulfill yourself with. Work is something you love to do, not something you do with your eye on the timeclock. . . . A job is different. We have replaced the concept of work with the concept of the job. A job is something we give as little of ourselves to as possible and try to get as much for as we can, and try to get away from as soon as we can. . . . I don't use the term "leisure." I use the term "work" as I'm going to use the correlative term "play." It is work in the old sense which we need to recapture, work that gives us buoyancy and a feeling of expressiveness, work which we may do while we're making a living, but also that we may do off the job while we're making a life . . . .*

*I suggest that there is something very different from fun. There is play . . . Play is something which is totally expressive but doesn't end in a product. It doesn't have to end in a product. It is a thing in itself, worthwhile in itself"* (335).

Another has made the distinction between work and play in other terms:

*Work is the main course, the meat and the substance of our lives. Recreation is the dessert; we like it best in modest portions at the end of a good meal. When we try to substitute the dessert for the meal itself, we lose our taste for it* (72, p. 23).

Kelso and Adler stated the relationships among work, leisure, and play this way:

*Play, like sleep, washes away the fatigues and tensions that result from the service occupations of life, all the forms of labor which produce the goods of subsistence and all the leisure activities which produce the goods of civilization. Play and sleep, as Aristotle pointed out, are for the sake of these services and socially useful occupations. Since the activities of leisure can be as exacting and tiring as the activities of toil, some form of relaxation, whether sleep or play or both, is required by those who work productively (300, p. 17).*

Brightbill has defined "play" as "the free, happy, and natural expression of animals—especially the human animal . . . When we refer to adult activity," he continues, "play might more fittingly be called *recreation*" (72, p. 30).

It is clear that when we refer to recreation we are not indicating any particular activity or class of activities. That which is work for one can easily be regarded as recreation by another. There is another important distinction to be made with regard to this term. Whereas recreation up to this point has been discussed in its general connotations, we are particularly interested in it as an organized service profession. Perhaps the term Recreation Education, or Recreation Leadership would be more appropriate in this context. In any event, we will need to look at both the general nature of recreation, its history and cultural implications, as well as at the systematized structure that has been created to deal with the leisure time activities of human beings.

## PROFESSIONAL OBJECTIVES

### OBJECTIVES OF PHYSICAL EDUCATION

It has been mentioned that regardless of the philosophical winds that have blown through physical education over the years, certain objectives have consistently retained a prominent place in the overall aims of the profession. Two of these are, of course, health and physical fitness. Because these particular objectives have persisted, it must not be assumed that they are universally accepted as being the most important objectives. Because disagreement about the relative importance of particular objectives is inevitable, it is impossible to make any list of primary and secondary objectives that will be satisfactory to the entire profession.

On the other hand, it is possible to group most of the commonly held objectives into a few descriptive categories. This has been done in a great variety of ways, some more detailed than others.

*Organic development* is generally considered to be of importance. This would include, among other things, the maintenance of health through good health practices and the development of physical fitness including sufficient strength, circulo-respiratory and muscular endurance to avoid excessive fatigue and to insure adequate energy levels. Although the development of sports and recreational skills is usually covered under a separate heading of *neuromuscular development*, it too could be considered one of the organic objectives.

*Social development* is another objective that is universally listed. The ability to function effectively with others and in groups is usually considered an important outcome to be sought through physical education. The emotional control that may be learned as a part of participation in games and contests is considered important. The acquisition of the qualities of cooperation, leadership, and related factors is also valued.

Closely related to social development is the objective of *psychological development*. Subsumed under this heading would be such things as improved personality characteristics, self-confidence, self-respect, and opportunity for self-fulfillment and self-realization. Frequently included in this category are claims that physical education contributes to the generalized learning abilities of the child. A few schools have deliberately designed their curricula with this objective uppermost in their thinking.

The *cognitive objective* (sometimes called *intellectual development*) is that traditionally stressed by teachers of "academic" subjects. Although health educators have long been concerned with helping students gain understanding of certain facts and principles, physical educators have generally limited their cognitive emphasis to knowledge of rules and strategy of sports and games. It is apparent, however, that the cognitive objective has assumed a role of major importance in recent years. Much of this book is devoted to the subject matter of physical education in the belief that the knowledge of such information is important to the welfare of professional and layman alike.

An objective that is seldom discussed is that of *philosophical development*. The great difficulty in dealing effectively with the teaching and evaluation of ethics and values is apparent. It has become increasingly apparent, however, that society is in urgent need of coming to grips with the problem of values in today's world. The question of whether sports and physical education effectively shape desirable value systems is one that must come under increasingly close scrutiny. The quality of the professional leadership available is obviously crucial to the attainment of any objective; it is of particular importance in the case of realizing philosophical objectives.

## CURRENT PRACTICE IN PHYSICAL EDUCATION

Which objectives are being stressed in physical education today? Of course, if one looks hard enough almost anything can be found somewhere. On the other hand, it is frequently possible to identify trends or patterns as they emerge in response to changing circumstances over a period of time.

After World War II, and especially since the late 1950s, the physical fitness status of American youngsters has certainly received a great deal of attention. Similarly, it is apparent that interscholastic athletics (beginning even at the elementary school level in some cases) are enjoying unprecedented popularity. On the basis of these informal


**FIGURE 2.1** Physical education has taken many different forms. Widely differing emphases can be found, as *illustrated:* (A) modern dance, (B) sports skills, (C) physiological effects of exercise, (D) gymnastics.

living and well-being and to concentrate on the most valuable of these. This would mean that even though society may value very highly the ability of its citizens to get along with one another peaceably, physical education would not make these its major aims because many other aspects of the school program (drama, music, school government, and classroom and committee assignments) contribute to the social objectives. It would, of course, cooperate in making efforts wherever it could to reinforce desirable behavior in this regard.

Illustrations of the things that might be seen as being unique to physical education would be concerns such as physical fitness, sports skills, exercise techniques, and intellectual awareness of the physiological and psychological effects of exercise and sports participation. It should be noted that these are only examples and should not be interpreted as being an exhaustive list of the unique concerns of physical education. The only criterion required for determining whether a given objective should be placed on the list would be that of unique and ultimate responsibility. That is, if a given individual appears to have failed in the attainment of certain objectives, *to whom can he be referred for remedial action?* If, for example, a student seems continually depressed and uncommunicative despite all efforts of the instructor, he should be referred to the school psychologist. On the other hand, where does the instructor send the youngster who is chronically low on the physical fitness scale? The fact is that there is no one (including physicians, physiologists, and therapists) who have the training and background in this area that the physical educator is expected to have. Therefore, physical fitness is classified as one of the unique objectives. The only question remaining is whether it is a sufficiently important objective to be given priority. This decision must be made on the basis of philosophical considerations.

From the preceding discussion it should be clear that if one views physical education primarily as a tool to be used in achieving overall educational goals, then its primary objectives will change whenever changes in society's educational emphasis occur. Under such conditions physical education is a process or procedure, not a discipline, and cannot logically have any objectives of its own. If, however, physical educational emphasis occur. Under such conditions physical education is ber of legitimate objectives can be established *independent* of the goals of general education. Because such goals would be oriented to the preservation of the efficiency of movement (that is, the prevention of degenerative disease, the acquisition of desirable body image, the development of certain kinesthetic appreciations, and so on), they would generally be in harmony with the aims of general education. In many cases the realization of the goals of physical education (particularly those related to physical and mental health) would be prerequisite to the pursuit of many of the socially and/or politically determined goals of general education.

Up until the present, however, it is evident that physical education has been viewed pretty much as a tool of general education in the achievement of broad, cultural goals. As a result there have been a great many changes in the emphasis of physical education both in this country and abroad.

## Opportunities in Physical Education

Physical education is an extremely broad profession frequently merging into health education programs or recreation programs. Because the programs he is equipped to direct and the objectives he is dedicated to pursuing are utilized by different organizations in a variety of settings, the competent, *well prepared* physical educator will discover that he has a choice of many professional opportunities.

The various divisions of the school structure offer a great many opportunities to the prospective professional. Physical education teachers are needed at elementary, junior high, senior high, junior college, and college levels. Elementary specialists are in increasing demand, including both men and women. Some of the most challenging and exciting work in physical education is now being conducted at the elementary school level.

The junior and senior high schools continue to provide the bulk of positions. With burgeoning populations and new construction everywhere, positions are more numerous than ever before. It should be carefully noted, however, that in some areas of the country there are more male physical educators graduated than there are positions, particularly at the secondary level. Keep in mind, however, that there is always a demand for the *good, well prepared* physical educator. This concept, involving a clearcut distinction between positions in coaching and physical education, will be amplified later. Of course positions for women at the secondary level are always available, many of them remaining unfilled for lack of applicants.

At the college level there are several kinds of professional opportunity. One of these involves teachers of skills and games. Traditional college programs usually provide opportunities for students to enroll in classes in which they can improve or maintain physical fitness levels and learn skills that will be useful to them in their post-college years. Most colleges require at least a master's degree of all teachers, and many require higher degrees.

In recent years there has been considerable interest in revising college required physical education programs to place more emphasis on the *understanding* of how physical activity, sport, and play contribute to the health and well-being of the individual. Such programs are designed to add a dimension to traditional skill and fitness-oriented programs and should not be interpreted as a substitution of intellectual activity for physical activity. Teachers in this kind of program require greater depth of training than is usually available in the master's degree curriculum. Most schools employ team teaching techniques in conducting the various aspects of such programs.

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Of course the training of future teachers of physical education requires large numbers of competent professors. Such positions almost always require a doctoral degree as well as teaching experience at other levels. In addition to professional teaching opportunities, many universities now have research specialists who have only limited teaching responsibilities and spend most of their time in research endeavors.

Other positions for which graduate work is required include administrative or supervisory positions at all levels of physical education. While coaching responsibilities are not generally regarded as requiring advanced graduate study, many colleges do not hire people for coaching responsibilities alone, and in such cases advanced degrees are mandatory.

Opportunities existing outside the schools cannot all be listed. Some of those most commonly pursued by physical educators are found in organizations such as the YMCA, YWCA, YMHA, community centers, and municipal or private clubs. Boys' clubs, hospitals, churches, industrial concerns and other agencies also frequently employ physical education specialists.

It is becoming clear that this is an age of specialization. While a broad background is always necessary for effective professional accomplishment, today's problems require an expertise that cannot be attained without specialized study. This means not only better undergraduate theoretical and technical preparation but also advanced study. Specialists are commonly employed for positions in dance, acquatics, elementary physical education and gymnastics in the public schools. At the college level specialization is even more narrow. The person who plans to make the most of his potential must strive to secure the best possible undergraduate preparation upon which to select and build a future specialty.

## OBJECTIVES OF HEALTH EDUCATION

In terms of the establishment of general objectives, health educators have (at least in recent years) achieved greater unanimity than have physical educators. Since "health" has been defined in rather specific terms, it has been relatively simple to devise objectives for the educator to pursue.

It must be emphasized, however, that the field of health education is so broad (encompassing everything from sex education to the problem of metabolic disturbance resulting from rapid time zone change in east-west air travel) that it is essential that priorities be established on the basis of importance. Since there is always basis for disagreement on relative importance of specific objectives, there is still considerable disparity among health education programs throughout the country.

Many problems have been encountered in dealing with controversial topics such as sex education, birth control, drug abuse, alcoholism, fluoridation, and smoking. It is virtually impossible to separate social issues and value judgments from such issues, yet health educators are frequently forbidden to utilize any methods other than an objective approach (if indeed,

profession comes immediately to mind, but many of the other possibilities for service in this important area are not so apparent to the student beginning his college studies. Medical sociology, physical therapy, sanitation engineering, public health nursing, hospital administration, medical technology, biostatistics, and dental hygiene are just a few examples of many health-related career opportunities. These, of course, require preparation of varying kinds and amounts not usually a part of the programs in university departments of health, physical education, and recreation. The careers for which you can prepare in such departments are more likely to directly involve education. There is a need for more well prepared health educators, public and school. The school health educator is concerned primarily with planning and conducting educational programs within the public school organization, though he certainly can promote public health education as well. Most persons trained in health education have naturally gravitated in the direction of public school teaching positions. But public health departments and agencies are more and more becoming interested in utilizing the full-time services of public health educators. They also recognize the need for more in-depth preparation of such persons, especially with regard to the scientific bases of health.

The health educator with a baccalaureate degree may also continue his professional preparation by studying for a master's degree. Those with the interest, background, and intellectual capacity can achieve a doctorate, specializing either in health-related research or in health education or both. Such professionals most often choose to affiliate themselves with colleges or universities, but there are other agencies and institutions in need of these professionals as well.

The need is apparent and the opportunities for service in the health-related professions are both great and varied.

## OBJECTIVES OF RECREATION

Like the objectives of physical education and health education, the objectives of recreation have undergone change over the years. The goals sought by each teacher will, of course, vary depending upon the people and problems with which he works.

The Commission on Goals for American Recreation has produced a statement encompassing six objectives (119).

1. Personal fulfillment. In emphasizing the importance of the individual in our society, recreation is viewed as having one outstanding purpose: to enrich the lives of people. "One approaches personal fulfillment as he narrows the gap between his potentialities and his accomplishments." The recreation leader's challenge is to provide experiences "through which the individual may enjoy success in his search for adequacy or self-esteem."

2. Democratic human relations. Since exclusive concentration on personal goals may lead to the development of

selfish, noncooperative individuals, other goals relating to ethical behavior and social responsibility are important. Leaders are urged to be alert for opportunities to cultivate "respect for human beings and concern for their welfare."

3. Leisure skills and interests. People engage in activities that they perform well. Development of a high degree of skill is regarded as the best means of insuring interest and participation in a given activity. Enlarging the scope of people's interests is regarded as contributing to a more rewarding life.

4. Health and fitness. Vigorous muscular exercise is regarded as an essential factor in the maintenance of the healthy, vigorous organism. Because contemporary society has so drastically reduced man's opportunities for vigorous activity, it is regarded as essential that recreation programs include and encourage involvement in vigorous physical activity.

5. Creative expression and esthetic appreciation. Emphasis on opportunities for personal expression and creative experiences is important as an antidote for some of the negative effects of an increasingly materialistic society. With increased leisure for all people creative participation in life is seen as assuming unprecedented importance.

6. Environment for living in a leisure society. Recreation seeks to counteract some of the effects of the destruction of our natural resources by providing facilities and experiences that will bring people into contact with nature. Participation in and enjoyment of music and drama as well as other artistic and esthetic endeavors is another goal which is sought by recreation leaders as they work to add meaning and enrichment to the lives of people.

It is apparent that to select any one objective as being more important than others is difficult because they are closely interrelated. There are certain aspects of each, however, that are of common interest to health and physical educators as well as recreation people. Because of these common objectives it is possible for training in certain professional subjects to benefit individuals preparing for each of these professions.

If the recreation person is to be interested in the fitness of those with whom he works, he must have a basic understanding of fitness, what it is, how it is maintained, and what its limitations are. The same is true for motor development and the teaching of motor skills.

Psychological principles are particularly important. Because there is no real coercive element in recreation programs, programs will be engaged in solely on the basis of their appeal or the appeal of the recreation personnel. An understanding of human behavior can spell the difference between success and failure.

Although the public does not really understand what a university recreation course consists of, the prospective recreational specialist should. Obviously, it is not necessary to have four years of college training in order to teach a class in crafts or square dance. Nor is such training necessary for success in leading sports programs and running tournaments. If recreation programs are

to achieve more than simply "keeping the kids off the street," however, preparation of leaders who understand the problems and know the principles involved in developing solutions requires *at least* four years of college level preparation.

## Opportunities in Recreation

Recreational opportunities, as one would expect, have expanded enormously in the past twenty years. Because so many kinds of programs are provided in communities, people with widely divergent interests may find employment in one of them.

Some of the institutions and agencies with organized recreation programs and recreation personnel are:

1. Federal, state, city, and local governmental divisions. This includes parks, schools, conservation departments, military establishments, forestry service, and welfare agencies. Federal grants are currently providing a number of extensive recreation programs.
2. Private agencies. Well-known agencies such as the YMCA, YWCA, YMHA, church-sponsored community centers, Boy Scouts, Girl Scouts, and Campfire Girls continue to require large numbers of qualified leaders. Other organizations such as private clubs, camps, and charitable organizations require leaders with training to operate camps and organize community projects.
3. Commercial agencies. Many commercial enterprises hire specialists in the organization and teaching of recreational activities. Summer resorts, bowling alleys, theaters, food specialty chains, and manufacturers of sporting goods are some of the kinds of agencies interested in recreation.
4. Industrial plants. Industrial plants have moved into the area of recreation with large programs. Frequently programs are sponsored throughout the year for the entire family of the employee. With the recognition of the fact that private industry must take a large share of responsibility for the provision of things that will assist less affluent members of our society to achieve their potential, more emphasis is likely to be placed on programs such as these.
5. School programs. It has long been evident that schools in city and suburban areas needed to become centers for more kinds of community activity. Taxpayers are beginning to insist that the vast funds expended in school construction return greater dividends in terms of more use. This means that recreation programs, not just for children but for all segments of the community, are being established in school facilities. Although school personnel may occasionally be involved in such endeavors, the programs themselves are frequently separate from the school operation, and personnel are not school teachers putting in extra hours. Such "lighted schoolhouse" programs can aid in solving the fundamental problems of providing the necessary funds to meet the needs of the community.

## Effectiveness of Recreation Programs

The evaluation of the effectiveness of recreation programs in terms of the established objectives is exceedingly

difficult. Because other factors also bear on those that the recreation professional is interested in, it is difficult to conclude just which factors produce what effects.

The new governmental programs mentioned previously, for example, utilize a great many techniques in attempting to get potentially capable youngsters prepared for college. Recreation is only one of these techniques. It is difficult to evaluate reports claiming success in teaching Spanish or geometry in Head Start programs by the incorporation of recreation techniques. Another problem is that when we begin talking about the use of recreational techniques in teaching or in obtaining some desired behavior, are we still talking about recreation? Some people feel that we are not.

It is easier to assess the effects of leadership on the kinds of programs produced and the number who participate. These kinds of research have considerable usefulness in establishing the need for capable recreation leaders. For example, a report by Chandler and Hyde (98) indicated that in an institution for elderly people, the social interaction and participation of socializing activities were dependent upon the presence of a recreation leader. His absence resulted in a 50 percent reduction in socializing behavior.

Other studies relating to health, physical fitness, social, and psychological characteristics have been reported in other sections of this book. Many of these could be regarded as being pertinent to recreation because of the kinds of activities involved.

There remains a great deal to be learned about the overall effects that recreation programs can have on our complex, confusing culture. Can the depersonalizing effects of the computer age be forstalled? Can concern and compassion be a part of a mechanized, sophisticated (sometimes cynical) society? These are only examples of the important questions that need answers.

*Play is more than a pastime, it is a fundamental tool for the discovery and rediscovery of the meaning of living. An understanding of the relationship between play and the development and fulfillment of the self is a prerequisite for effective programing. The creation of recreation theory rests upon this cornerstone (506, p. 50).*

## SUMMARY

Definitions of physical education vary significantly and are usually phrased in terms of what physical educators *do* rather than what they study. Part of the difficulty in coming to substantial agreement on primary objectives for physical education may stem from lack of agreement about what physical education really is. It has been suggested that the study of human physical activity, with all its implications, should define the limits of physical education.

Health education has had few problems of definition, but "health" as a concept has undergone considerable expansion in recent years. While separate classes in health education are found in most of the larger schools, full-time health educators are still the exception rather than the rule.

Recreation, as a career, defies precise definition, much as physical education does. Its operation is closely associated with man's leisure but is certainly not synonymous with it. The concepts of work, play, and recreation are complexly intertwined making the tasks of recreation leaders exceedingly important, as well as difficult.

Although it is not currently possible to get physical educators to agree on the *primary* objectives of physical education, the major objectives most often articulated can be placed into general categories such as: (1) organic development, (2) social development, (3) psychological development, (4) development of cognition, (5) philosophical development. The objectives most commonly stressed have fluctuated with social conditions and shifts in educational philosophy. It is suggested that the objectives most commonly pursued with greatest vigor are not necessarily the objectives of greatest importance to the welfare of the student.

Criteria for the establishment of objectives are based on philosophical considerations. The wide variety of objectives is understandable in the light of differences in philosophy within the profession. One way to simplify the problem of selection of primary objectives would be to make selections on the basis of the *uniqueness* of contributions of physical education to individuals. One problem is that this procedure ignores the establishment of priorities in terms of the relative *importance* of all possible objectives. That is, if uniqueness *alone* were used as a criterion, the matter of whether a given objective has any relevance to the needs of individuals would not even be considered. Selection of only the unique, *important* objectives again involves philosophical considerations and may narrow the scope of professional concern excessively.

The broad, basic objectives of health education have been well articulated and are widely accepted. Other problems have been encountered, however, in the matter of controversial subject matter (such as drugs, sex education, and smoking) and in the matters of exactly which techniques should be used in the pursuit of desired objectives.

Objectives of professional recreation leaders have changed considerably in recent years as social problems have multiplied. Although *primary* objectives of recreation may differ substantially from those of health education or physical education, the tools and activities used in their achievment are nearly identical with those used in the other professions. Opportunities for employment in each of the three fields are greater today than ever before. The serious nature of the problems now being faced has, however, made the quality of professional preparation an extremely important factor in securing desirable positions.

## PRINCIPLES

1. If man is viewed as an entity (as opposed to the old dualistic concept of a mind and a body), the term "physical education" becomes entirely unwieldy as a name for a discipline.

2. The boundaries of a discipline cannot be adequately defined in terms of what its professional members do. Generally, it must be described in terms of "the study of . . . " rather than "the teaching of. . . . "

3. If an overall discipline can be defined as the study of human physical activity, physical education (the teaching of concepts, skills, and techniques), would logically become the educational arm of the discipline.

4. Health, as a concept, is more than mere absence of disease; it is a state of complete physical, mental, and social well-being.

5. Political and economic conditions have resulted in the possibility of mass leisure that looms simultaneously as a potential threat and a potential blessing.

6. The fact that a given professional objective has widespread approval and practical support does *not* necessarily mean that it is more important than other less popular objectives.

7. Two distinct approaches to the problem of determining objectives to be given priority can be identified. One is to determine the needs of the student and shape objectives to fit these needs; the other is to identify the potential *unique* contributions of the discipline and structure objectives around them.

## EXPERIMENTS AND EXPERIENCES

1. Create a check sheet listing as many "possible objectives" of physical education as the class can formulate. Each class member should then rank these objectives in the order that he *believes* most accurately reflects the objectives of high school physical education programs.

2. Survey the class and determine the percentage of students who have experienced formal, classroom instruction in health (apart from that incorporated into science courses).

3. Contact all available community recreation agencies and determine the number of events sponsored that have as their objective the improved health of their members.

4. Obtain a list of facilities available for recreation in your city. Estimate the maximum number of people that could be accommodated at any one time. What implications does this have for future programs of recreation?

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# Development and Current Status of the Professions

## Chapter 3

### STATUS OF PHYSICAL EDUCATION

In looking at the picture in the public schools today, it is easy to identify the major patterns followed by physical educators. Sports skills and physical fitness are obviously the two factors most commonly stressed. Furthermore, in many instances the fitness objective is applied to the great mass of students while the skills objective is vigorously pursued with only a relatively few talented performers, who are usually members of interscholastic teams. Although it is true that the skills of team and individual sports are used as the basis of the curriculum in most schools today, inadequate facilities, large classes, and other factors have resulted in programs providing very little individual evaluation and instruction for most students. On the other hand, great attention has been given to this type of instruction at the varsity level.

In very blunt terms this means that in too many schools physical education classes consist of large groups of students being turned loose in small gymnasiums to play some form of team game. Instruction is usually minimal or entirely absent.

Evaluation of student needs and progress is usually a matter of guesswork rather than objective measurement. On the other hand, varsity sports are given a great deal of attention, time, and money. The coach-player ratio is very low, and several assistants are usually available to aid the head coach.

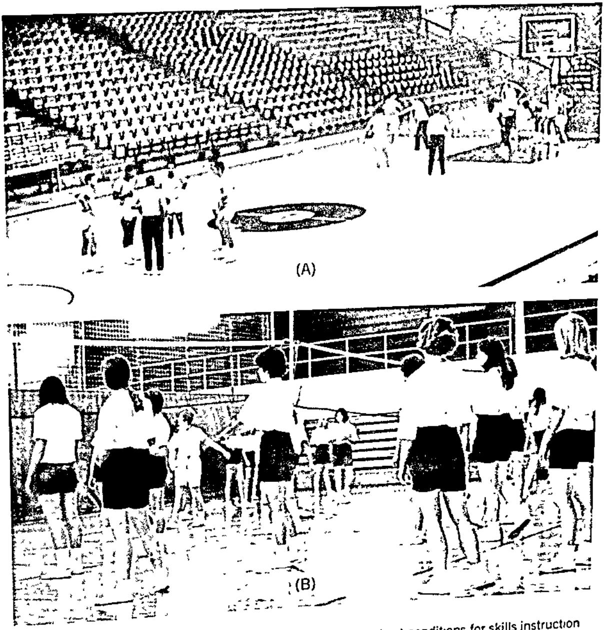

**FIGURE 3.1** Even in the finest American school systems, the best conditions for skills instruction (as illustrated by student teacher ratio and adequacy of facilities) are provided for those who have the greatest ability. Pictured are: (A) varsity basketball players and coaches and (B) girls' physical education class and teacher.

## DEVELOPMENT OF PHYSICAL EDUCATION

As has already been pointed out, several factors in our recent history have combined to shape our present philosophies and practices in physical education, as well as health education and recreation. If you are typical of the student who is just entering one of these professions, you are more interested in considering the future than the past. For that reason a detailed discussion of the history of physical education will not be presented. But because it is helpful in many ways to understand some of the events that have led up to our present circumstances, a brief backward glance will be taken here.

Physical education as a part of the public school curriculum may well owe its existence to war. The physical survival of individuals, as well as societies, has historically depended upon the ability of men to defeat other men in physical combat. It is not surprising to find, in looking back over the years, that nations have always demanded increased fitness for their citizens whenever wars have threatened.

### PREHISTORY

If one is willing to interpret *physical education* in a very liberal way, it is possible to say that the instructions given by cave-dwelling fathers to their sons in techniques of stalking and killing game (as well as human enemies) constituted a kind of physical education. Indeed, survival depended upon swiftness of foot and strength of arm; survival of the fittest was the most fundamental of laws. Under such circumstances of daily crisis (or "war") there is no doubt that physical fitness was a state to be highly valued. Observations of this kind have only limited value, of course, because no one would suggest that there existed any kind of formalized program of education during this period.

The earliest known records of systemized instruction in exercise for purposes other than combat are those from early Egypt and surrounding regions. It is apparent that, for certain classes of people at least, skill was developed in activities such as swimming, wrestling, dancing, and gymnastics as early as 2000 B.C. Instruction in activities more directly related to combat, such as archery, riding, and boxing, was also common.

### EARLY CIVILIZATION

Although it is generally agreed that civilization developed earliest in the southern Mediterranean countries, it is also apparent that the Chinese produced a remarkable early culture. As the mystical religions of the east developed, less and less emphasis was placed on the care of the body. Because war was viewed more as a necessary evil than as a worthy pursuit of life, educational systems for the training of soldiers did not become as highly developed as in other countries. Ancient China did, however, produce a system of light exercises designed to prevent disease. This form of medical

gymnastics called *Cong Fu* combined stretching and breathing exercises and was usually performed in a sitting or kneeling position.

Examination of historical accounts of other ancient civilizations indicates that most activities that could conceivably be labeled "physical education" were generally connected either with religious rites (as with the dance) or with preparation for combat. From a recreational standpoint there have been games and pursuits such as hunting, fishing, and other activities practiced since antiquity. Some of the most ancient artifacts are toys that were used by children in their play. Ancient references to ball games of one kind or another can be found in both written accounts and art of the various periods.

## EARLY JEWISH INFLUENCE

One of the ancient cultures having most influence in the development of Western civilization was that of the Hebrew people. Whereas the great emphasis on education generally excluded anything that could really be called physical education, it is of great interest to note the fact that the religious laws provided for health practices that were far advanced over other civilizations of the time. Cleanliness in the preparation of foods, the cleansing of eating utensils, and the washing of wounds under running water anticipated many modern disease-prevention practices.

Although the ancient Hebrew people apparently had great respect for human strength and although they certainly recognized the need for training for warfare, their culture made little provision for sport or games. Whereas the influence of conquerors had, from time to time, caused Jewish communities to build stadiums or other sporting facilities, such influences were usually rejected when the domination of the conquerors ended. So, although we have derived many of our precepts about education and the responsibility of parents for the education of their children from the Hebrew tradition, little else that directly applies to physical education or modern recreational practices can be attributed to the ancient Jewish influence.

## THE GOLDEN AGE

On the other hand, one of the cultures having the greatest influence on modern practices in our profession was that of the early Greek civilization. One of the most obvious signs of this influence is that of the Olympic Games; this sporting festival originated in Greece about 776 B.C. as one of several such festivals held periodically. They achieved such importance that wars among various city-states came to a halt temporarily in order that the Olympics might be held every fourth year.

The idea of periodic international athletic competition is only one of many concepts that have been borrowed from the remarkable culture of the early Greeks. This period has been called the Golden Age because of the almost unbelievable contributions it made to the culture of man. Art, science, music, drama, philosophy, education,

commerce, agriculture, and practically every other endeavor of man received a tremendous acceleration during this period. In short, this was the birth of Western civilization.

Most of the information we have about the ancient Greeks has come to us through such accounts of life as were recorded by Homer in the *Iliad* and the *Odyssey*. Through the accounts of such heroes as Achilles and Odysseus we learn not only of the ideals valued by society but also of the educational aims and goals. The detailed accounts of the funeral games and the religious ceremonies give us a picture of a vigorous people who, even though they were in a position to make choices, apparently had no desire to lead a life of ease. We are also led to see the development of a society that placed the highest possible value on the harmonious development of all aspects of an individual's capabilities; action and wisdom were highly prized as characteristics to be equally developed. It is interesting to note that as the Greek culture evolved, it became taken for granted that every citizen had a responsibility to exercise daily in addition to other duties, including strenuous military training. The state provided gymnasiums for the use of all male citizens, and it was expected that even older men would make use of the facilities for their physical well-being. Of course, it must be remembered that cultural activities of other kinds also took place at the gymnasium, especially during the later period of that age.

It must not be assumed that aims and practices were uniform throughout ancient Greece or that these remained constant across the years. You will remember that Greece was composed of a group of city-states, each independent from the other. Athens and Sparta were two of the largest and most influential and are representative of differing attitudes toward the citizen's preparation to meet these responsibilities. Although a more detailed discussion of the philosophies involved will be found in Chapter 7, you will remember that, in general, Sparta stressed military preparedness and discipline whereas Athens was noted for its more democratic emphasis in securing the services of the individual for the state. There were other differences as well, but there were also some significant similarities.

One of the most interesting characteristics of the city-states was their belief in the involvement of citizens in the affairs of the state. This is exemplified not only in the training for fighting that was expected of every citizen but also in the fact that the citizens themselves were the participants in the games of the various festivals. Apparently nothing was more highly prized than to be the well-rounded man, a perfect balance between the man of action and the man of wisdom.

It has been said that one of the significant reasons for the great cultural accomplishments of this period was that unusual individual freedom of thought and action was coupled with individual responsibility for civic affairs. Similarly, it has been observed that this society passed its pinnacle when freedom led to individualism without a civic concern. When prestige

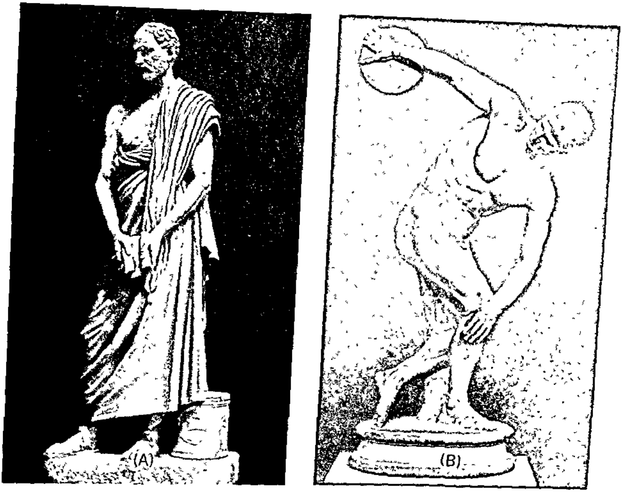


**FIGURE 3.2** Ancient Greece was remarkable for its equal emphasis on the perfection of physical and mental attributes. (A) Demosthenes, antique sculpture (Vatican Musuem, Rome, Alinari–Art Reference Bureau). (B) Myron's Discobolus, Roman copy after bronze original (National Museum, Rome).

became more easily obtainable through wealth and political power than through individual cultural and physical accomplishments, the strength of the city-states began to crumble. The vulnerability of Greece was further increased by the shift in concept from idealizing the man of balanced action and wisdom to idealizing the man of wisdom only.

If the story of physical education in Greece were nothing more than another example of how a young, vigorous nation rose to a position of prominence and then, through neglect of physical vitality, fell prey to another more vigorous culture, there would be little that is unique to study. In this case, however, physical activity, athletic performance, and the maintenance of physical fitness were regarded, for the first time, as something more than mere preparation for war or individual combat. There was a period at the height of the Greek civilization when education was thought to be complete only when a

man could perform as well as think. For a young man to exhibit a flabby body was to admit a deficiency in his education (see Chapter 7).

Furthermore, the esthetics of performance were highly valued. The appearance of the body was ideally to suggest a fine balance and harmony of development. The classical Greek statuary indicates the esteem in which grace and harmony were held, as opposed to muscular bulk for its own sake. It is also true that during this period the quality or appearance of the performance was regarded as highly as was the final outcome in terms of winning and losing.

With the decline in participation in games by the citizenry and the concomitant increase in professionalism, less and less emphasis was placed upon the *experience* of performing; the *outcome*, as well as the entertainment provided by the spectacle, became the important factors.

## ROMAN INFLUENCE

After the Greek civilization fell to the Macedonians, and later to the Roman Empire, much of the unique character of the Greek attitude toward physical education was lost. The Roman had no taste for the Greek tendency to involve himself in the games and contests of the many festivals. The Roman preferred to observe the giant free spectacles from the comfort of the grandstand. Furthermore, the Roman had become accustomed to the emotionally charged spectacles of bloody gladiatorial combat and brutal contests between animals as well as between men and animals. The relatively tame contests involving the throwing of the javelin or the discus had little attraction for him. And whereas he found some entertainment in observing the time honored wrestling and boxing contests of the Greeks, he found it necessary to brutalize even these. The wearing of nailed gloves and riveted fist wrappings became so popular that blows produced gory wounds and hideous permanent injury, if not death. It is little wonder that after years of observing "athletic" contests of this nature, founders of the early Christian church turned away from any consideration of physical activity or exercise as a worthwhile pursuit. The fact that many of the early Christians were slaves who might themselves be subjected to deadly mock wars or animal combat in the arena for the pleasure of the masses might well have encouraged them to emphasize the spiritual, otherworldly aspects of their religion.

Whatever the reasons, it is a fact that as the influence of Christianity grew, the legitimacy of sport and physical training declined. The glorification of the body came to be regarded as a sinful tendency to be resisted at all costs. It was during this period that the body and spirit were pictured as two separate entities constantly warring against each other. In order to elevate the spirit, and thereby come closer to God, people subjected themselves to all kinds of physical discomforts and tortures. Any suggestion during this period that man was a single organism and that the

well-being of the body could be a positive contribution to his spiritual condition would have been vigorously rejected.

As more and more attention was given to the staging of splendid entertainment and as vast sums of money were devoted to luxurious living, the economy of the Roman Empire began to collapse. Those who were wealthy tried to outdo each other in extravagance, while the peasants became progressively poorer and almost without influence in a land that had once prospered with the proud peasant-soldier as its backbone. The paid professional soldiers felt little civic pride or responsibility. Oratory, always prized by the Roman as being almost more desirable than wisdom itself, became a tool merely to sway the voters. Statesmanship disappeared into a welter of selfish, individual aims.

As the training of soldiers became a matter of preparing professionals, the military education of the general male citizenry became less and less necessary. Whereas the war-related activities such as riding, swimming, archery, and so on remained popular activities among the rich for some time, gradually a love of luxurious living replaced these things. The famous Roman Baths were extremely popular among both men and women. Here one could while away countless hours in the warmth and steam of these luxurious facilities. Strenuous activity held little attraction for people under these conditions.

With the decay of civic pride and economic responsibility came political vulnerability. Invaders from the north were successful in raids upon Roman communities. As the barbarian attacks increased, the beautiful cities were plundered and the population was scattered and killed. People were forced to seek shelter in castles or similar fortified communities, each an independent unit. Peasants worked the fields around the walled sanctuaries in exchange for the protection of the owner in times of danger.

## THE DARK AGES

The destruction of the Empire left centuries of progress lying in the dust. Cultural and economic interchange ceased almost entirely. Society took a backward step into an almost tribal existence. The one remaining factor giving some semblance of order and continuity to society was the Church.

of knowledge, to comprehend the period of nearly a thousand years of retrogression and stagnation as far as learning was concerned. Only a worldwide nuclear holocaust could approximate today the conditions prevailing at the depths of the terror-ridden Dark Ages. Under such circumstances survival is the only objective of any personal importance; cultural considerations are nonexistent.

## THE RENAISSANCE

About the tenth century, however, there were stirrings of interest in matters beyond the local level. The causes and implications of this beginning of the period known as the Renaissance cannot be discussed here, except to indicate that religion and the Church played an important part in this revival of culture. The simple fact that representatives of European areas began to venture once again into unknown lands created the conditions for exchange of knowledge, an aroused curiosity concerning other peoples, and a basis for at least a limited commerce among peoples. The crusades into the holy lands, as destructive and as poorly conceived as they often were, did contribute substantially to the rekindling of interest in learning and culture.

It was during this time that knighthood provided the only arena in which any physical education was practiced. The familiar stories of jousting and tournaments provide descriptions of the kinds of activities that young men of noble birth, at least, might hope to pursue. But it is clear that these activities were really no different than those practiced over a thousand years earlier. One significant difference, however, was the creed of chivalry that served over the years as a prominent factor in raising barbarianism to the level of civilization.

Despite the fact that the new enlightenment brought the development of universities and the congregation of young men who frequently engaged in games and sports of one kind or another, there was no official sanction or encouragement of such amusements. Gradually some of the private schools of southern Europe began to include some provision for exercise and recreation. In most others, however, such activities were either ignored or frowned upon by educators of the day.

This is not to say that there was not considerable interest in sporting activities during the Renaissance. Fencing masters were in great demand among the wealthier segments of society. Bowling on the green, tennis, and dancing, as well as other spectator amusements, were very popular. In an era when courtliness and good manners were stressed, many of these activities were considered indispensable means of promoting proper carriage and grace. All this was in addition to the time-honored practices of riding, wrestling, swimming, shooting, and other combat-related activities.

As the renewed interest in learning progressed, it was accompanied by a great social and political upheaval. Dis-

satisfaction with punitive economic practices spelled the collapse of feudalism, just as revolt against religious despotism resulted in far-reaching political and religious reforms. And although the Protestant reformation led to the creation of many denominations and sects, it did not produce greater religious tolerance. Conflict and persecution were responsible in a large measure for the establishment of colonies in the lands newly discovered by those who were seeking new trade routes. The hard work and privation required for survival in frontier settlements combined with religious doctrines (that tended to brand as sinful any form of recreation) to effectively prevent acceptance of physical education as a part of the school curriculum in the New World, as well as throughout much of the Old World. Social events were generally built around one of two legitimate activities: worship or work. Any activities that might be termed recreational needed to have some productive purpose such as that provided by quilting bees, house raising, or harvest contests. Even the natural playfulness of children was considered frivolous activity that must be curbed as early as possible.

## THE ENLIGHTENMENT

In the seventeenth century it was the rule rather than the exception to regard children as being little adults. In this kind of atmosphere it is not surprising that little thought was given to needs for physical education in the school programs of the day. There were those, however, who were strongly opposed to this philosophy. One of the best known of the so-called naturalists, who led the philosophical revolt against the practices in the eighteenth century, was Jean Jacques Rousseau. This noted French philosopher meticulously outlined an educational program that gave great emphasis to the development of physical stamina, strength, and coordination. The concept that it was a *human being* that was to be educated rather than a *mind* (as distinct from a body) was in direct opposition to the then current beliefs and practices.

Although Rousseau's ideas were tried in only a few private schools of his day, the ideas did not die. As cultural climates became more amenable to ideas of individualism, his concepts and others of similar direction came to be included in the design of curricula in various countries.

However, it was only through a long, complex series of social changes, including wars, political upheavals, philosophical and scientific advancement that physical education became an integral part of any educational system. As always, preparation for war continued to be one of the strong motivating forces for the inclusion of physical education in the school programs. This factor alone, however, seldom seemed sufficient for the justification of its inclusion. In most nations the increased awareness of the necessity for adequate exercise in the optimum development of children was an important consideration.

## EUROPEAN SYSTEMS

Germany and Sweden are the two countries that come to mind most readily whenever early programs of physical education in the schools are discussed. Out of Germany evolved gymnastics oriented to the use of so-called heavy apparatus such as parallel bars and vaulting horses. Friedrich Ludwig Jahn and, later, Adolph Speiss were responsible for development of much of the German System. Swedish gymnastics, largely attributed to Per Henrik Ling, were performed in conjunction with balance beams, stall bars, and other equipment of a "lighter" nature. Elaborate progressions and stipulations of proper form for the performance of exercises in both systems were painstakingly developed by their respective proponents.

At about this same period of the nineteenth century, the "public" schools of England were developing their own approach to physical education. These schools (which, despite their name, were maintained for the benefit of the aristocratic families only) stressed classical studies of language and literature as well as some science. In addition to these studies, the boys participated in a growing number of individual and team sports and games. Tennis, swimming, boxing, soccer, cricket, boating, and other activities became extremely popular at these institutions. Administrators of these schools encouraged this kind of participation not only for the physical fitness values they provided but also for the qualities of leadership, perseverence, and sportsmanship that they were believed to promote. It is noteworthy that despite efforts to popularize the formal European gymnastics programs in England, the populace never accepted them with the enthusiasm that they retained for their sports and games.

Today, as we look around the globe at the various systems of physical education as they are currently practiced, we can see clearly the influence of the three systems just discussed. The intensely competitive colonization not only expanded empires but also carried cultural influences, such as these favored systems of physical education, to many parts of the world.

Of course, the cultures into which systems were introduced determined whether they would be successful in meeting the needs and desires of the people of the culture involved. In America, for example, both the Swedish and German systems were introduced into the school systems at approximately the same time; both enjoyed some success. It is apparent today, however, that the predominant influence in American schools is that derived from the British society. It is clear that the nature of a people combines with prevailing economic and political conditions to produce educational practices. The United States has adopted a blend of the European systems to which it has added its own unique modifications. This is not to say that there is any such thing as a *national* curriculum in physical education. Surely many regional and local variations persist, both in regard to type of activity and quality of program. Generally speaking,

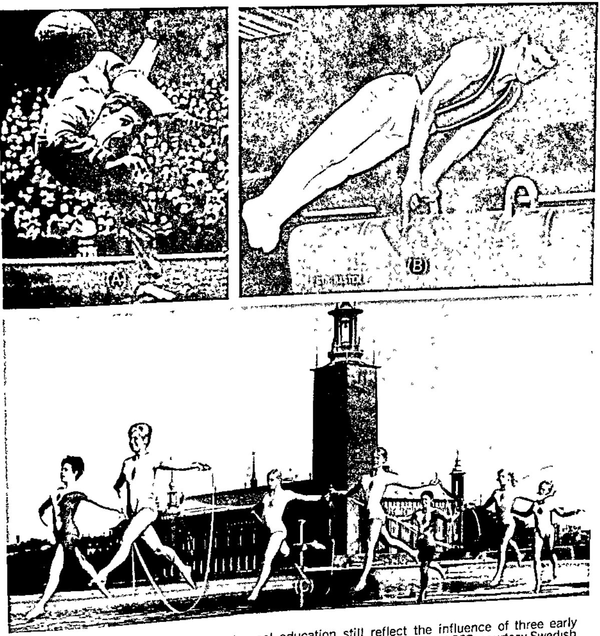


**FIGURE 3.3** Modern programs of physical education still reflect the influence of three early systems: (A) English, (B) German, and (C) Swedish, picturing the Sofia Girls, 1968, courtesy Swedish Information Service.

however, programs of physical education in this country are built around the sports-and-games concept. Criticisms regarding the alleged inadequacy of such programs for the building of adequate fitness levels have been met by the addition of more formal types of activity to existing programs, in most cases, rather than a change in emphasis and replacement by activities designed strictly for the development of physical fitness.

## TODAY'S PHYSICAL EDUCATION

If we discount the remarkable culture of the early Greeks, we can see that physical education is really a very recent development in man's history. When we stop to consider that the earliest systems of physical education were introduced into the schools only about 150 years ago (and less than 100 years ago in the United States), it is apparent that we are dealing with a very young aspect of education. When we then look at the changes that have occurred in the world within the last 100 years as compared with all that have gone before, it is not surprising that there are differences of opinion about what the main purpose of physical education should be in America and the world.

### THE FUTURE

There is little doubt that the next ten years will be critical ones for physical education in the United States. We will be facing problems that man has never before encountered. The role that physical education is to play in the lives of people will be determined by a great many factors, including social preferences, educational aims, economic goals and conditions, and political pressures. If our profession is to survive and emerge as a truly positive contributor to the welfare of mankind, physical educators themselves must become aware of:

1. The ways in which physical activity affects man and his environment
2. The ways in which man and his environment limit, encourage, and generally affect human physical activity

## CURRENT STATUS OF HEALTH EDUCATION

When we address ourselves to the question, "Where is health education today?" we naturally turn our thoughts to the questions: "Where were we?" and "How long has it been since we were there?" Investigation leads to two somewhat striking answers to the latter questions: "It was awfully dark and bleak where we were and it has been less than a hundred years since we were there." To put it another way, health education is "young," and it has grown and developed tremendously since its earliest beginnings about 1870, when it was nothing more than a temperance and antivice program with some anatomy, physiology, and hygiene thrown in for good measure.

### EARLY PRACTICES

Ancient societies, including the Chinese, Egyptians, Hebrews, Greeks, and Romans, including a period from about 3000 B.C. to A.D. 1700, were concerned to some extent about physical well-being and stressed certain rules for hygienic living. Emphasis was placed most commonly upon "physical" health and well-being and the absence of disease. Horace Mann, in 1840, stressed the importance of physical well-being and "educating for health," (188, p. 14)

but was largely ignored. The public health movement in the United States began in 1850. At that time city governments began to establish and upgrade health departments as a direct result of Lemuel Shattuck's *Report of the Sanitary Commission of Massachusetts* (188, 223). In this report, Shattuck described a modern program of public health—especially preventive programs—and gave impetus to the idea that health was more than absence of disease. Perhaps of even greater importance were his suggestions for *health education.*

Ohio instituted a state program in 1872; it was typical of those instituted from that time until about 1918 in that it was "anti-vice and function-of-the-body" oriented as a result of the powerful temperance-sponsored propaganda movement. Health as it is now conceived was not emphasized until sometime after World War II.

We can approximate the progress of health education from the early 1930s to the present by perusal of several typical health texts for college students. Williams' (609) fourth edition of *Personal Hygiene Applied,* for example, was published in 1931 and included several chapters on the meaning of health, the health problem, man in society, the approach to health knowledge, and science and attitudes, all apparently directed at setting the mood for effective learning. The remainder of the text was devoted to "the hygiene of" each of the major systems of the body and to nutrition, the mouth, eye and ear, and "sexual aspects of life." One chapter was devoted to "prevention of specific diseases." Hygiene and the study of body function was still in vogue in 1931, but *eleven* small-size pages were devoted to some sex education!

By the mid 1950s there was less emphasis on the systems of the body per se. See, for example, Kilander's *Health for Modern Living* (310). Personality and mental health, dating, courtship and marriage, growth and development, nutrition and weight control, relaxation and recreation, study of stimulants and depressants, alcohol and tobacco, more extensive treatment of disease, planning medical protection, and national health resources were now typical of health education content.

## TODAY'S HEALTH EDUCATION

In the mid 1960s we apparently had returned to some emphasis on the function of the body's system per se and some effort at defining the importance of health education. In Miller and Burt's *Good Health* (390) we see that physical fitness was added and that there was more extensive treatment of sexuality and reproduction. Family planning appeared, and strong emphasis on problems related to tobacco, alcohol, and narcotics was continued. Consumer health appeared on the scene, as did greater emphasis on *community* health and personal appearance. Some coverage of emergency first-aid procedures and a discussion of radiation dangers were also included.

Another development has been health education's recent trend in the

direction of the conceptual or "big ideas" approach to learning. Perhaps it is too early to call this a trend, but considerable time and money was spent on the development of a conceptual model for school health education, and it appears most likely that the approach will be more and more utilized. The approach is based on the precept that the "big ideas" or basic concepts are better retained and assimilated than are facts. There are three key concepts: growing and developing, decision making, and interactions. The new terminology may be somewhat misleading, but when we turn to the ten concepts subsumed by the three key concepts, the picture becomes clearer. These ten concepts are listed in Table 3.1. Categorized under each of the ten concepts there are from two to four substantive elements, a total of thirty-one of these in all. The curriculum then is organized around these substantive elements in terms of goals for the learner and behavioral outcomes at a particular developmental or grade level.

There is yet another bit of evidence that leads one to believe some health educators have awakened. The *ideal* approach is no longer viewed as the textbook and lecture method; there are problem solving and experiments (as well as the older movie-film, posters, pictures and television methods). Although the idealistic new programs are not yet widely being used, the fact that they are being utilized at all is encouraging.

## THE FUTURE

As a final note and fitting close to the discussion of the question, "Where is health education?", let us say "not where it *has* been (fortunately!) but not yet where it can be." To be sure, there are encouraging signs as we have pointed out. But every school does not yet teach health as it should be taught (too many still do not teach it at all); and the

**TABLE 3.1 Ten Concepts for Health Education**

| |
|---|
| Growth and development influences and is influenced by the structure and functioning of the individual. |
| Growing and developing follows a predictable sequence, yet is unique for each individual. |
| Protection and promotion of health is an individual, community, and international responsibility. |
| The potential for hazards and accidents exists, whatever the environment. |
| There are reciprocal relationships involving man, disease, and environment. |
| The family serves to perpetuate man and to fulfill certain health needs. |
| Personal health practices are affected by a complexity of forces, often conflicting. |
| Utilization of health information, products, and services is guided by values and perceptions |
| Uses of substances that modify mood and behavior arise from a variety of motivations |
| Food selection and eating patterns are determined by physical, social, mental, economic, and cultural factors. |

SOURCE Health Education A Conceptual Approach to Curriculum Design. Washington, D.C., School Health Study, 1967, p. 20

conceptual model is still just that—a *model*; the test is yet to come—can and *will* these dynamic new ideas in health education be utilized effectively?

## THE DEVELOPMENT OF RECREATION

### EARLY BEGINNINGS

The concern over the problem of learning to deal with leisure has sprung from several sources. Americans tend to believe that the phenomenon of free time is unique to the modern, industrialized societies. You may recall that the ancient Greeks (and the Egyptians before them) had a great many festival days during the year and that the Romans are reputed to have had nearly as many holidays as workdays. It is generally conceded that the failure to wisely utilize this time was a contributing factor to the downfall of the Roman empire.

Of course, festivals and religious holidays are only one means of assessing the degree of recreation engaged in by ancient societies. There is no doubt that man has always been compelled to play. "Abolish religion and recreation from the face of the earth and within two moons they would return again" (72, p. 106). Both of these activities involving man's attempts at self-fulfillment and search for meaning have played significant roles in the development of civilization. Recreation is a means of dealing with boredom, and it is clear that much of the leisure of man has been spent in imaginative ways of meeting challenges presented to him by his culture.

Although recreational pursuits must have persisted among common people during the Dark Ages, the available records concerning such activity deal only with royalty and Church figures. The Renaissance produced another kind of activity to be utilized during leisure, that of learning. It was during and after the Reformation, however, that the roots of the "evils of idleness" idea took hold.

The period of colonialization carried cultures of established societies throughout the world. Religious differences provided the impetus for many of the early settlers to leave Europe, and some of the persecuted groups colonizing the inhospitable new lands developed attitudes that have had profound effects on succeeding generations.

### ATTITUDES TOWARD PLAY

One of the most enduring of these attitudes was that developed concerning work. Any unproductive activity was deemed sinful. Because play and other recreational activities were obviously unproductive, they were equated with the sins of idleness and sloth and were firmly discouraged. Many of the recreational activities of that time were "disguised" by the addition of a work element. Husking bees, barn raisings, and similar events became events to look forward to with great anticipation. Even though the harsh environmental conditions were gradually controlled, the Puritan "work ethic" persisted,

and its influence spread throughout the early United States.

It is of considerable interest to note the relationship between recreation and the Church during this time. Although "play" was not permitted (or was frowned upon, at least) the religious activities became extremely popular. Lonely settlers came great distances to attend evangelistic meetings in tents or cleared areas. Accounts of these services give an indication of the extent to which religion, in a sense, became a substitute for recreation (161, p. 80).

It was not until the Industrial Revolution, however, that the American citizen (as well as the European) began to learn what leisure meant. Less time was required to meet the requirements of life, and more money became available for recreational use. The expansion of business opportunities, however, became almost a "game" in itself. Because work had always been a legitimate outlet for one's energies, the excitement of commercial competition, getting and spending, attracted the attention of many.

The money produced by this rush of business activity, associated with the growth of cities around industrial complexes, made possible the development of "spectating." Horse racing, professional foot racing, boat racing, and other types of competition attracted large throngs of spectators, frequently taxing the capacities of transportation and housing facilities. "Phineas T. Barnum of circus fame stands out as the leading figure of this period in amusing the populace. No struggle between dramatic standards and popular taste ever troubled the master showman of them all. He was not one whit interested in art; he was interested in entertainment" (161, p. 122). Barnum's ability to provide a vast variety of entertainment for the people of the 1850s may have had a significant effect on their readiness to pay for the opportunity of viewing athletic teams compete.

The first recorded football game between colleges was played in 1869 between Princeton and Rutgers. Three games were played, and there were twenty-five players on each side. It took a few years for the game to catch on (it was banned because of increasing roughness), but after some rules changes and after further exposure, the groundwork was laid for the establishment of rivalries that have since attracted millions of spectators.

The growth of sports not only provided people a chance to observe and to be entertained but also gave them new outlets for involvement and participation. In addition to these, activities such as bicycling and then "joy riding" in automobiles provided opportunities for fun and excitement that are still enjoyed today.

## MODERN LEISURE

The changes of the first half of the twentieth century are of little interest to the youngster who has never known anything but television, supersonic aircraft, and computer technology. He will be interested, however, in the effect that the changes produced in

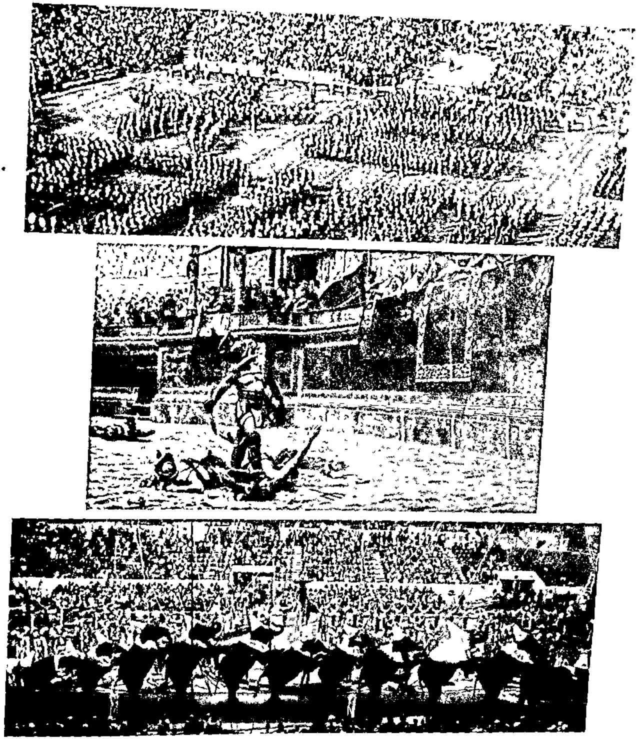

**FIGURE 3.4** Modern man is little different from his predecessors in his love for the diversion and entertainment provided by colorful and violent spectacles. (*Top, half-time entertainment at college football game; center, "Pollice Verso," 1874, by Jean Leon Gérôme, now in Phoenix Art Museum, Phoenix, Arizona; bottom, Ringling Bros. and Barnum & Bailey Circus photograph.*)

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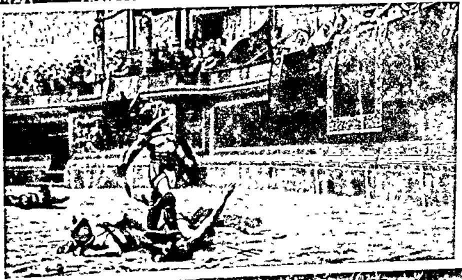

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society by automation will cause in his personal life. It is precisely this kind of problem that the professional recreation worker will be trying to help solve.

## THE FUTURE

In justifying the need for recreational leaders and recreational programs, authorities point to a number of factors of which we are all basically aware. The forty-hour work week may be reduced to thirty within the next ten years. Increased wages and the guaranteed annual wage (which has become a reality for more and more people) coupled with an unprecedented production have increased the spending power of millions. Unemployment rates have seasonal fluctuations, but unemployment insurance helps to reduce the difficulties encountered during such times. The population explosion has created a housing and a school crisis in the cities. The burgeoning social expectations of minority groups have produced a restlessness and a social mobility that is unprecedented in the history of the world. The combination of increased leisure, more money, and unfulfilled expectations is expected to produce social and economic problems whose solutions will require the dedicated efforts of a great many people. We can expect increased concern on the part of government and industry as well, and not always on the basis of objective humanitarianism. Concerning the relationships of recreation to the economy, *Fortune Magazine* reported: "The leisure market may become the dynamic component of the whole economy" (161, p. 393). In reviewing publications of the amounts spent by Americans for equipment and services related to recreation (such as the *Life* article, "A $40 Billion Bill Just for Fun"), Dulles came to the conclusion that "Play had to be considered a virtue for the sake of the nation's prosperity" (161, p. 392).

### Work and Play Today

As a consequence of the factors that have been mentioned (as well as others), the concepts of "work" and "play" in our society have undergone curious changes. This change is pointed out in Chapter 17 in terms of the implications it has for physical education in the schools. It has just as serious implications for nearly all other professions.

After reviewing the research in this area, Sessoms notes:

> *Traditionally, Western man has viewed work as the major determinator of social status, but with advanced technology and mechanization, work is losing its social importance. Increasingly . . . leisure has replaced work as life's central interest.*
>
> *For many, it is not an easy transition. There are feelings of guilt and shame; leisure has been for too long synonymous with idleness, and the prestige ascribed to adult play is woefully low. Work may not be meaninfgul but neither may be leisure* (506, p. 44).

". . . neither may be leisure"—this is the problem that faces the prospective recreation professional. The task

of helping to create a new value system in which meaningful leisure pursuits are possible is a tremendously important one. It is apparent that jobs can no longer provide meaning for the vast majority of people, and it is certain that this situation will not improve.

## SUMMARY

Examination of the current status of physical education reveals a strong emphasis on physical fitness for the masses of students while a concern for the teaching of physical skills is limited to a relative few. Highly talented individuals, especially those engaging in varsity sports, appear to receive the bulk of attention given to intensive skills training.

A brief historical survey indicates that the fitness objective has long been likened to the objective for preparedness for war. While fighting and hunting skills were prized in past ancient cultures, the early Greeks stand out for their remarkable contributions to physical education as well as to all other aspects of civilization. Few if any cultures have had as profound an effect upon the modern philosophies of physical education as that of the Greeks.

Other cultures, including that of the once-proud Roman Empire and some of those rising out of the dismal years called the Dark Ages following Rome's fall, have made contributions to physical education. With the Renaissance and the Protestant reformation, great strides were taken toward regaining the levels of civilization once enjoyed.

With the advent of improved education, ideas about the role of physical activity in man's life again stirred some interest. "Systems" of physical education gradually developed around individuals and came to be identified with specific countries.

With expansion of colonial territories in the new world, these systems became incorporated, adapted, and modified to blend into the new cultural setting. The phenomenal growth of population centers, educational systems, and economic opportunity provided by our civilization has created a culture that has affected American physical education in many ways. The rapidity of growth and the absence of clear-cut goals has placed physical education in the position of being forced to justify its very existance at a time in history when it should, theoretically, be making its greatest contribution. The challenge is clear and the opportunities will be great in the years immediately ahead. Realization of the potential contribution of physical education will be dependent upon the dedication and preparation of tomorrow's physical educators.

Health education, as distinct from interests in medicine itself, is really much younger than physical education. Practices of early people, including taboos and rituals designed to preserve health, were often specified by decree or custom. Aside from scattered records, little is known about efforts to educate people concerning personal health practices.

The origins of health education in the United States as well as its evolu-

tion can be conveniently traced by examination of the content of popular health texts from the early 1930s up to the present time. Recent years have seen a great expansion in breadth of health topics as well as intensified interest in new and more effective ways of making health knowledge a meaningful factor in human behavior.

The history of recreation is as old as play itself. From a formal standpoint, however, the festivals of ancient peoples give us our first glimpse of organized recreation. Physical education and recreation suffered common fates during the Dark Ages and the succeeding years. Religion played a large part in formulating attitudes toward work and play, with the latter being, for a time, practically equated with sin.

The Industrial Revolution, accompanied by economic development and increased leisure, gave birth to an upsurge in recreational interest and activity. In the United States, these conditions contributed to a tremendously increased interest in spectator sports. Modern automation has only accelerated the trend to greater economic growth accompanied by increased leisure. The concepts of work, play, fun, job have become less and less clear as profound cultural changes have occurred with increasing rapidity.

Heavy responsibility for helping to create new value systems for an age of leisure rests with today's recreation personnel. The significance of recreation in American life within the next few years can scarcely be overemphasized.

## PRINCIPLES

1. Attitudes of a populace toward the concepts of work, play, leisure, and recreation have profound effects upon the vitality and direction of the society.
2. Failure to utilize free time in a meaningful, satisfying way can contribute substantially to the decay of an otherwise sophisticated society.
3. Historically, concern for the physical fitness of any population has been linked to the objective of military preparedness.
4. Physical education takes on profoundly different values when viewed from the standpoint of dualism (mind versus body) as opposed to monism (a single, unitary being).

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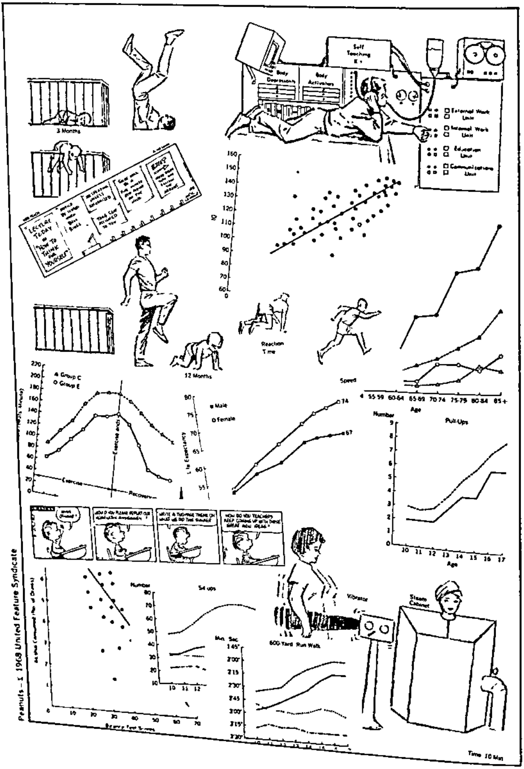


Self Teaching
Body Depressants
Body Activators
External Work Unit
Internal Work Unit
Education Unit
Communications Unit
3 Months
LECTURE TODAY on "HOW TO THINK FOR YOURSELF"
IQ
12 Months
Reaction Time
Speed
Age
Group C
Group E
Exercise ends
Exercise
Recovery
Male
Female
Life Expectancy
74
67
Number
Pull-Ups
Age
WRITE A TWO-PAGE THEME ON WHAT WE DID THIS SUMMER
HOW DO YOU TEACHERS KEEP COMING UP WITH THESE GREAT NEW IDEAS?
Number
Vibrator
Steam Cabinet
600-Yard Run Walk
Min. Sec
Time 10 Min
Peanuts - © 1968 United Feature Syndicate

# *PART II*

# Essential Understandings

# Critical, Systematic Thinking

## Chapter 4

The "Miss Peach" cartoon (Figure 4.1) says it. Our experience with college students says it. Students say it, and some have started to rebel against its repression. Some educators are enough concerned about it to try to do something about it. We have attempted to do something about it in our own classes. This book is an attempt to do something about it. What is "it"? "It" is the need for developing an atmosphere for creativity and critical, systematic thinking. Unfortunately, our educational system has for years promoted just the opposite: conformism and regimented, "Polly-parrot learning." Fortunately, formal education has never been 100 percent successful in converting all of its products to conformist automatons incapable of critical and creative thinking. But, in our opinion, it has been far too successful. We see an effort in many schools to get away from this kind of "education," which is really more like indoctrination. You are fortunate if you have come up through a system of schools where the problem-solving approach to education is in vogue or at least present to some degree. If you are not so fortunate, you will have to go through some kind of a conversion process. It can be a painless con-

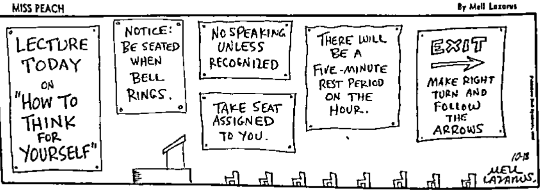



FIGURE 4.1 Miss Peach by Mell Lazarus © Field Enterprises Inc.

version because it would seem to us to be more in keeping with the nature of man to wish to be his own master, so to speak, and not to be an automaton. Perhaps not. Perhaps all persons are not built of such stuff. But it can be said with certainty that only the ones who can think creatively and objectively and who can use the problem-solving scientific process will be the true professionals in our fields (see page 12). The rest will be technicians; for the ability to think systematically, critically, and creatively is the earmark of the professional. The professional *can think effectively for himself. He can make decisions.*

## PROBLEM SOLVING AND DECISION MAKING

You have already learned something about making decisions. Although technically there may be little difference between making a simple "choice" and making a "decision," the difference is essentially one of the stakes involved. Thus, it may be relatively simple to choose which shoes one will wear with a particular suit but quite another matter to decide on whether to pursue a career in engineering, medicine, or education. Choice is often based on whim or fancy; wise decisions are based on facts.

As society becomes more and more complex, the range of decisions one is called upon to make increases. Thus, it has become necessary to develop ways of insuring that wise decisions are made. In business and government, when the stakes are high, complex and technical systems have been developed to aid in the process of decision making. The laws of probability have been utilized by the statistician and a whole field of study called "decision theory" has been born. Although the ordinary citizen does not have at his disposal the resources of industry, he can adapt the basic ideas successfully employed there to make appropriate decisions in his own life. It is important that we understand the scientific principles that can be applied to the problem of making sensible decisions.

There is nothing particularly complex about the application of these principles. A review of the steps that should be utilized in problem solving and decision making may be helpful.

## LOGICAL STEPS

The first step is to recognize the problem. One may be aware that things are not right but have difficulty in identifying what is wrong. In this case, some careful observation of the circumstances is indicated. A scientist might call this "preliminary data collection." This careful and more purposeful kind of observation should help in formulating a theory about what steps might be useful in identifying and overcoming the problem.

Next, armed with this knowledge of what conditions actually exist, a theory or hypothesis about the kind of action that appears to be desirable can be formulated. This hypothesis may be worded in predictive terms: "If situation A exists (as it appears might be the case), then action B should result in outcome C." The careful statement of the problem in the form of a hypothesis is a major step in the direction of solution of the problem.

Once the hypothesis has been set up, it should be a relatively simple matter to test it in order to see whether the predicted results actually occur. If they do, then the appropriate course of action is clear. If the expected result does not come about, the original theory should be adjusted in the light of the new facts available and a new hypothesis set up for testing. In this manner it is often possible to determine not only "better" decisions for important problem-solving action but often "best" decisions.

Let's take a look at an example of how an individual might go about applying some of these principles to a personal problem. Suppose Mr. X has recently graduated from college. As a typical student he has always been fairly active in extracurricular activities that have kept him relatively trim and fit. As fall rolls around, he discovers that all last year's winter clothes are too tight. About the same time he notices that he seems to be a little soft and bulgy around the middle. Taking his cue from these simple observations, he makes certain other preliminary observations. He consults the most recent height-weight tables provided by his insurance man and discovers that he is about fifteen pounds above the weight recommended for one of his height and general stature. His physician also tells him that he is indeed overweight and should reduce. In studying his diet in order to determine whether his caloric intake is excessive, he discovers that it is about the same as it was all the time he was attending college.

Like all of us, he has been the target of a great deal of advertising concerning the benefits of vibrators, diet foods, drugs, exercise fads, and other "packages" designed to get rid of unwanted pounds and to restore a youthful appearance. Unlike many of us, however, he has taken the time to check into some of the claims made for the various reducing systems and has concluded that weight gain or loss in the

normal healthy person is the result of the balance between caloric intake and energy expenditure.

One obvious course of action in this case is simply to reduce caloric intake to an appropriate level and to attempt to maintain weight by diet control. This, of course, implies the necessity of enduring moderate levels of chronic hunger, possibly for the balance of his lifetime. On the other hand, an increase in energy expenditure should aid in the reduction of excess weight. Mr. X reasons that because he has not changed his dietary habits since college days his weight problem must be the result of the reduced level of physical activity inherent in his occupation. He hypothesizes, therefore, that if he compromises by increasing his level of activity by playing handball or tennis three times a week and by reducing his caloric intake moderately, he should be able to regain and maintain a more desirable weight and still enjoy a sense of fulfillment at the dinner table.

(It should be noted that there are other possible courses of action open to Mr. X, all dependent, of course, on the approval of his physician. One possibility might be to change the composition of his diet from predominately carbohydrates to proteins. Another might involve the use of appetite-inhibiting drugs or the institution of a series of starvation diets. In this case, however, he has selected the elements that seem to be most advantageous to him and has manipulated them into a pattern he plans to test.)

Once under way, Mr. X keeps a regular weight chart in order to assess his progress. At the end of six months he discovers that he has lost eight pounds and has suffered no discomfort. In addition, the bulge around the middle has nearly disappeared. At the end of a year he finds that he has slightly exceeded his goal and that his weight-loss pattern has leveled off. His hypothesis has been proved to be true and his problem has been solved.

Other examples of the scientific problem-solving approach could be given, but they are all based upon the same general considerations. The single, most important step in the whole process is the formulation of an appropriate hypothesis. When knowledge of underlying conditions is limited, it is, of course, difficult to visualize other courses of action. It has been observed that "a proper construction of the question is often half of its solution." But in order to "phrase the question," or sometimes even before one can recognize that he *has* a specific problem, it is necessary to have some understanding of the basic facts. In terms of individual health and physical fitness it is important to know, for example, what the relationships are between physical activity and caloric balance. One needs to understand how the human machinery utilizes its fuel and how it responds to various changes in grade and amount of fuel.

For the solution of other kinds of problems relating to individual welfare it is necessary to be acquainted with certain other basic facts about how the body works, not only as a biological machine but also as a *person*, an integrated human being with needs,

desires, aspirations, hopes, and fears. This is not to say that one must become a physician or a psychiatrist, but only that it is important that we all become acquainted with certain basic things about how we work and think and learn.

Merely possessing this knowledge is, of course, not enough. It takes a little creativity, a willingness to manipulate and examine the facts in order to be able to come up with a properly phrased question—a productive hypothesis.

## ACQUIRING DECISION-MAKING ABILITY

In order to develop this ability to make intelligent decisions based on facts and knowledge of the process, practice is necessary. No one is born with the knowledge of how to solve his own (or anyone else's) problems. This is a task that takes practice just as any skill requires practice if improvement is to take place. For this reason you should take the opportunity to experiment with some particular problem as it relates to your own health and fitness. You will need to give attention to the techniques of observing the available information, formulating your hypothesis and collecting and analyzing your data. You will also need to learn how to avoid certain errors in drawing conclusions, and, finally, you should use your imagination in the general application of your findings.

It should be apparent that the decision-making process just described in no way rules out individual human judgment. On the contrary, it simply harnesses it and provides it with much more favorable operating conditions.

The steps used in this "do it yourself" approach are simple. First, be aware of the general problem to be studied. Next, hypothesize about the outcome of the experiment: What do you think the results will be? You will then engage in the actual collection of data, which you will then need to organize in a meaningful manner. This usually involves drawing a picture of the results in the form of a graph, as well as organizing the data into chart form. When more than one person is involved you will also want to convert the performances of individuals into a single mean or average performance. Following this you should be able to look back at your original hypothesis or theory and decide whether or not it has been supported. Finally, you should make some judgments about whether your findings have any practical or general application.

There is an infinite number of examples of situations in physical education, health education, and recreation that require "decision making in the face of facts." Some problems are obvious and *require* some kind of decision before any appropriate action can be taken. Others result from the professional's dissatisfaction with the status quo or his curiosity about a better way to do something or concern about whether his students are really learning. Listed below are some hypothetical examples of each kind of problem the professional may face.

## OBVIOUS PROBLEMS

There are too many serious injuries in our intramural touch football program.

An alarming percentage of our sophomores are contracting venereal disease.

Attendance in our recreation program has dropped off 42 percent in the last month.

A certain ninth-grade student has suddenly stopped dressing for physical education class without apparent reason.

Students have asked for a program in sex education but parents have a negative attitude.

Our community has a heart disease death rate and a mental illness frequency that are well above even the national averages.

## SILENT PROBLEMS

Are my students really assimilating the important health concepts? If not, how can I improve my program to that end?

Is each of my students as physically fit as he or she can be? If not, why not? Then, what can I do to motivate them to improve within their individual capacities?

Is there a better method than my current one of teaching swimming skills?

Is my recreation program really meeting community needs?

Are my basketball players properly conditioned, or is there a better way than I am currently using?

Does regular exercise cause changes in the heart muscle that make it more resistant to coronary artery disease?

These are but a few examples. How would you go about solving these problems or answering these questions? You can certainly add many, many more.

The general pattern for decision making can be applied in every case, but creativity will be required to select the specific approach that best fits the particular problem. Some will involve experimental research, others will require only an appraisal of the *existing* situation. But each involves the basic pattern: recognition and identification of the problem (which may involve preliminary observations and/or data collection); a formulation of an hypothesis; testing of the hypothesis by appropriate means (collection of data, experimentation); drawing conclusions and making a decision.

# REPORTING EXPERIMENTAL DATA

As an illustration of how experimental research data are commonly reported, a simple experiment, performed during a class period, is presented. A simplified version of the format used by many scientific journals is used as the model.

## AN EXPERIMENT IN HUMAN STRENGTH

I. Purpose: The purpose of this experiment was to observe the relationship between isotonic strength and isometric strength.

II. Hypothesis: The original hypothesis was that isometric strength should be found to be greater than isotonic strength.

III. Procedure: Six student volunteers

were selected from a class. Students were tested singly and were not permitted to observe each other's performance.

A. Isometric test. Each student, in turn, was required to stand with his back against the wall and his feet on a low platform about eight inches from the wall. A five-foot bar was placed in his hands (palms up) after the elbows were flexed to a measured angle of 90°. A chain and cable arrangement extended from the center of the bar to a spot on the platform directly between the ankles of the subject.

Each subject was asked to make a maximal attempt at further flexing the elbows. The tension produced in the cable under these circumstances was measured by means of a cable tensiometer. Results were recorded to the nearest pound.

B. Isotonic test. The subject assumed a position similar to that described above; the maximum amount of weight (to the nearest five pounds) that each subject could "curl" from thighs to chest was determined. A series of trials with approximately five minutes of rest between each trial was instituted to determine maximal isotonic strength (the greatest load that could be curled *one time*). The first attempt was made with 60 percent of the maximal isometric performance placed on the bar. For subsequent trials, adjustments were made in increments of five pounds. All subjects' maximums were determined within four trials.

IV. Limitations: The small number of subjects was a limiting factor in this study. The order of presentation of the exercise tasks may have produced a fatigue effect which may have distorted the results.

V. Results and Discussion:

A. Results. The raw scores of each individual are shown in the table below.

| SUBJECT | STRENGTH ISOMETRIC | ISOTONIC |
|---|---|---|
| 1 | 72 | 45 |
| 2 | 90 | 60 |
| 3 | 103 | 75 |
| 4 | 85 | 60 |
| 5 | 60 | 35 |
| 6 | 70 | 45 |
| Total | 480 | 320 |
| Average | 80 | 53 |

The graph in Figure 4.1 shows a comparison of isometric and isotonic strength. The mean isometric strength was found to be eighty pounds, whereas the mean isotonic strength was fifty-three pounds.

B. Discussion. The apparent difference may be due to the fact that the angle of attachment of the biceps muscle to the bone is very efficient at 90° but progressively less efficient in either direction from this position. Thus, moving the bar bell

through the full range, which begins at about 180°, where the angle of attachment is less efficient, is more difficult than exerting force at the single point of the relatively ideal 90° of elbow flexion.

VI. Conclusions and Implications: On the basis of the data *collected in this experiment* the following conclusions are drawn:
   1. It appears that isometric strength is greater than isotonic strength, at least at 90° elbow flexion. It is possible that at other angles, isometric strength could be less than isotonic.
   2. Under these conditions the isotonic strength would appear to be approximately 68 percent of the isometric strength.

   It might be implied from this experiment that it is possible to exert more force through muscle contraction in slow movements than in more rapid ones.

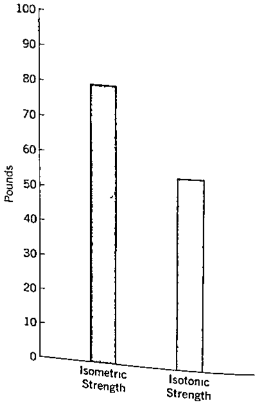
## CONSTRUCTING AND INTERPRETING GRAPHS

In the sample experiment above, a simple graph was used to illustrate the experimental findings. In this book, one of the techniques for facilitating your understanding of health and fitness information will be simply to present a table or graph that is self-explanatory and is not discussed at length. Despite the fact that graphs are widely used in popular magazines, newspapers, and books, many of us are not really graph-oriented. In order to assist those who have difficulty in interpreting graphic materials, several examples are presented below.

## THE BAR GRAPH

One of the simplest and most effective graphs for showing comparisons between groups or individuals is the bar graph. As shown in Figure 4.2, the message conveyed by such graphs is easily grasped. Here the average isometric strength of six men (eight pounds) is

FIGURE 4.2 A comparison of the means of the maximal isotonic and maximal isometric strength of six men.



represented by the bar labeled "Isometric Strength." The other bar represents maximal "Isotonic Strength," and extends upward until a value of fifty-three pounds is reached on the *vertical scale.*

In order to make the discussion of all graphs more simple, certain terms have been adopted to make communication easier. For example, the vertical scale on all graphs is called the *ordinate.* The *horizontal scale* is called the *abscissa.* Traditionally, the lowest or poorest scores of values begin at the bottom of the ordinate. When such a scale is used on the abscissa, the low values are placed at the extreme left and the high values at the right.

## THE LINE GRAPH

The line graph is another device commonly used to show *changes in status.* Here changes taking place over a period of time can be conveniently illustrated, as shown by the *acceleration of the* heart rates of the two groups shown in Figure 4.3. As can be seen, the average heart rate of the twelve men in Group E was 82 before the exercise began. As soon as they started walking on the treadmill, the heart rate began to increase. As the exercise progressed, the heart rate rose to a maximum of 160 *beats a minute, where it leveled off and remained until the exercise was terminated.* It can be seen that as soon as the exercise stopped the heart rates of both groups began to drop back toward normal. It should also be noted that the average heart rates of the men in Group E did not rise as high as shown for those in Group C, and also that Group E returned to normal more quickly than did Group C. In observing a plot like this we might conclude

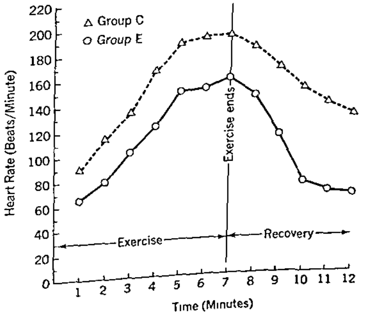



FIGURE 4.3 Mean heart rate responses to exercise of two groups of twelve men.

that the men in Group E were in better condition than those in Group C because they performed the standard task with less effort (as indicated by lower heart rates) and recovered from the exertion more quickly.

## THE CORRELATION PLOT

A device frequently used to illustrate the degree to which separate qualities are related is the correlation plot or scattergram. If we were interested in the relationship between IQ and academic success, for example, each individual in our study would need to have two scores: an IQ score and a cumulative grade point average. By arranging the possible IQ scores from low to high on the ordinate of the graph, and the academic achievement scores in the same manner on the abscissa, each individual can be represented by a single point on the scattergram. As shown in Figure 4.4, an individual with an IQ of 122 and a grade point average of 3.2 would be placed as indicated by the open dot. The solid dots all represent other individuals.

These questions now arise: Are IQ scores and grade point averages related, and if so, how closely? And is this relationship positive or negative?

It should be evident that if grade point averages went up one unit for every increased IQ unit, we would have a perfect positive relationship. All points would lie along one line and this line would form a 45° angle with either the ordinate (vertical scale) or the abscissa (horizontal scale). This would be a perfect positive correlation represented by a correlation coefficient of 1.0. Figure 4.5 illustrates such a correlation, indicating that academic achieve-

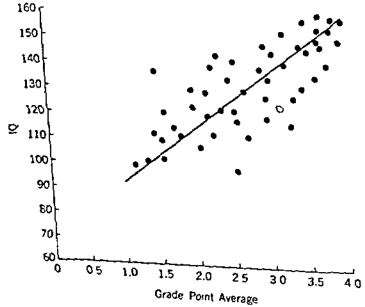



FIGURE 4.4 A scattergram comparison (correlation plot) of IQ and grade point average indicating the line of best fit. Open dot represents a student with IQ of 122 and grade point average of 3.2.

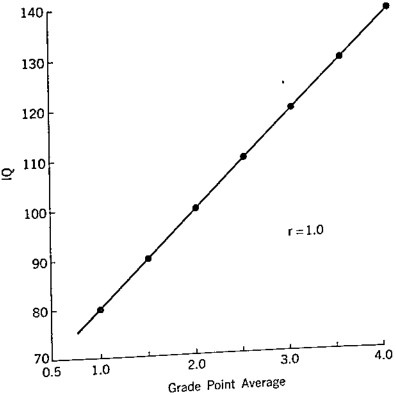



FIGURE 4.5 Hypothetical plot that might be obtained if IQ and grade point averages were perfectly correlated.

ment (as measured by grade point averages) is directly proportional to IQ.

Of course, two given factors are almost never perfectly correlated. A more realistic picture of the relationship between our two variables is shown in Figure 4.4. Here it will be seen that the scores, while forming a definite "directional" trend, do not all fall on the same line. A "line of best fit"[1] has been superimposed on this pattern to show the actual slope of the scattergram pattern. Because all points do not fall exactly on this line, and because the line does not slope at a 45° angle, the correlation is *less than* 1.0, and actually would be about .76. This is still a fairly strong correlation, indicating that there is a strong relationship between the two variables. That is to say, there is a strong tendency for those with high IQ's to attain better grade point averages.

Sometimes two items are related to each other, but in a *negative* direction. There is such an inverse, or negative, relationship between amounts of alcohol consumed and a test of balance (Figure 4.6). In this case a correlation of −.84 indicates strongly that the more alcohol one consumes the more poorly he is apt to score on the balance test.

If there is no correlation between two variables, the correlation coefficient approaches zero as shown in Figure 4.7.

There are other kinds of graphs, but these are the ones most commonly en-

[1]This can be calculated mathematically. There is only one line of best fit for a given set of points.

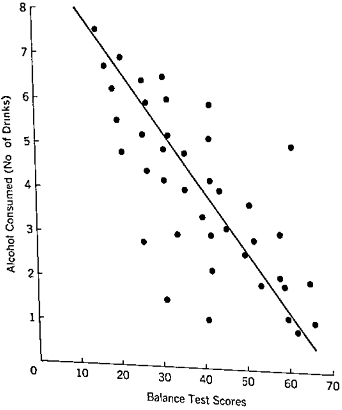



FIGURE 4 6 Hypothetical plot of scores on a balance test and amount of alcohol consumed. Line of best fit indicates a negative correlation.

countered. Sometimes a great many variables are all recorded on the same graph, so that considerable patience is required to determine exactly what is shown by the various curves. Interpretation of these more complex graphs is basically no different, however, from the interpretation of the simple ones just discussed; they merely require a little more study.

It should be pointed out that a high positive or negative correlation is not necessarily indicative of a cause-and-effect relationship. A correlation coefficient can be calculated or portrayed in a plot where two kinds of numerical scores are available, whether or not a real and practical relationship exists between the two measures. The classic example goes something like this: There is a high correlation between the number of storks per month flying over a large city and the number of births per month; this obviously is coincidence, not cause and effect, and does not prove that storks do, after all, bring babies! It may also be that two factors *are* related, not just coincidentally, but from the experimental data we cannot establish which is "cause" and which "effect." Be careful to use some common sense in interpreting correlations.

## CREATIVITY

It is our hope that you will have ample opportunity in your formal college

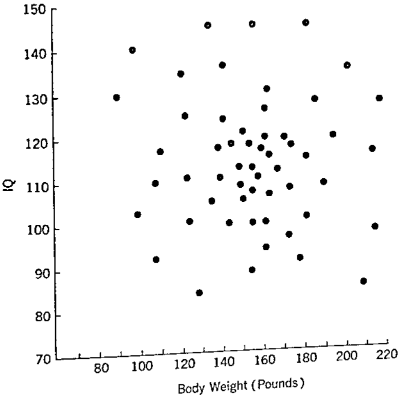



FIGURE 4.7 Hypothetical plot of IQ and body weight. No single line of best fit can be established; no relationship exists between the variables.

education to develop a creative, critical, and systematic approach to your profession. Given that opportunity, some will respond, some will not; some will become professionals, some will not. Of course it takes more than a knowledge of *how* to solve a problem *or how* to conduct an experiment or research project to be the complete professional. One must be alert to the subtle personal needs of the persons with whom one is dealing and to the program needs that *all too often are not very obvious*. One cannot assume that "no news is good news," that "no complaints from administration and no complaints from students" means that a program is sound and effective. This is where it takes a professional, a dedicated person who can and *will* think critically, creatively, and systematically. In other words, one cannot sit back and wait to solve problems that are brought to him. He must, as often as possible, seek them out and initiate solutions before they become any more detrimental to the welfare of the people involved and to the ultimate success of the program. This is part of the "creativity" aspect of the professional's job and is, of course, *directly dependent upon his interest in his program and its participants.*

The concepts presented in this chapter lead logically to a discussion of health and well-being of the individual because the creative and systematic thinking is ultimately directed at im-


FIGURE 4 8 © 1968 United Feature Syndicate.

proving programs so as to promote and improve man's well-being. In the next chapter, we will discuss health and physical fitness concepts as one of the specific and common concerns of health education and recreation.

## SUMMARY

The ability to think systematically, critically, and creatively distinguishes the professional from the technician. He can and should make intelligent decisions.

The professional must be alert to "silent" problems as well as those which have become obvious.

Use of appropriate bar and line graphs provides for better understanding of the data and their interpretation.

## PRINCIPLES

1. The problem-solving or scientific method involves recognition and identification of the problem or question, formulation of a working hypothesis, testing the hypothesis, drawing conclusions and making some kind of decision.

2. There is a basic format for reporting research results which insures that the essential elements are covered and which also facilitates follow-up research by other investigators.

3. A positive or negative correlation or relationship which exists between two variables may mean one of three things:

   a. Nothing—the numerical manipulation provides a high correlation but the basic assumption is in error and thus the correlation is meaningless (example: high correlation between physical fitness and height when sample included ages 6 through 17).

   b. Relationship is meaningful but "cause and effect" is not established (example: high negative correlation between daily activity and degree of obesity in rats; which causes which?)

   c. Relationship is meaningful and "cause and effect" has been established (example: follow-up study to one in (b.) alone indicates that rats forced to exercise daily do not become as obese as those forced to remain sedentary; thus inactivity apparently precedes obesity and not vice versa).

## EXPERIMENTS AND EXPERIENCES

1. List some examples of variables which might be correlated but in a meaningless way.
2. Write up two research reports (one a survey, one an experiment) as follows:
   a. Identify a problem or question which interests you.
   b. State your working hypothesis.
   c. Describe the procedure in careful detail (as though you have carried out the study).
   d. Describe and graph three possible alternative results (two extremes and "nothing").
   e. Draw conclusions based on each of the three alternative results.
   f. Make a decision based on each alternative result.
3. Describe how you might apply the problem-solving method to a theoretical nonexperimental problem in physical education, health education, or recreation.
4. See how many examples of inappropriate use of statistics you can find.
5. Many of the experiments and experiences listed at the end of other chapters will also provide opportunity to develop the scientific, problem-solving techniques of inquiry.

## SUGGESTED READING

Hanson, D. L., "Influence of Hawthorne Effect Upon Physical Education Research," *Research Quarterly*, 38:723, 1967.

Huff, D., *How To Lie With Statistics*. New York: W. W. Norton & Company, Inc., 1954.

Teraslinna, P., "On Publishable Research Articles," *Research Quarterly*, 38:154, 1967.

VanDalen, D. B., "Hypotheses and Deduced Consequences," *Research Quarterly*, 33:316, 1962.

# Health and Physical Fitness Concepts

## Chapter 5

In order to discuss *health* and *physical fitness*, the status of both, and the means of improving these qualities, we must come to some understanding of what these terms mean. We will operate on the basis of the following definitions, treating these qualities for the moment as though they were separate, distinct, and unrelated qualities (which, in reality, they are not). Health is generally taken to mean "freedom from defect and disease" or, in a more positive sense, "mental and physical well-being" or "soundness of body and mind." Physical fitness, although there are many and varied definitions, each with its own peculiar tangent, is generally taken to mean "the capacity to carry out physical tasks" (especially those tasks requiring considerable muscular effort, which tasks in turn require a well-conditioned neuro-skeleto-muscular system and/or circulo-respiratory system).

We will first take a look at our current health status, then discuss some misconceptions about physical fitness before analyzing current fitness status. We will then direct attention toward the theoretical relationship between health and physical fitness, the effects of regular exercise on health (longevity,

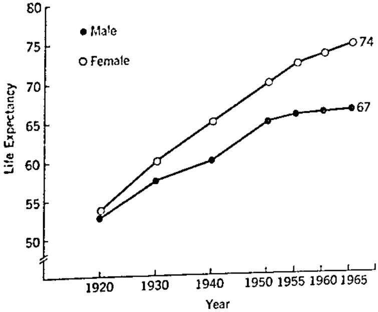



**FIGURE 5.1** Life expectancy for men and women in the United States, 1920-1965. Adapted from *Statistical Abstract of the United States* (578)

resistance to infection, and so on), and, finally, will discuss health appraisal.

## CURRENT HEALTH STATUS

It is difficult to find incontrovertible evidence regarding the actual causes of gross population changes in health status. We can, however, identify relevant facts and figures. These data, coupled with discrete observations and new statistics presented from time to time, can aid in the process of deduction. You can then reach some logical conclusions of your own. These conclusions, in turn, can be interpreted in the light of health needs. Again, we have employed the problem-solving technique: the data are presented in simplified form, thus challenging you and allowing you to reach your own conclusion as to the meaning of each particular table or graph. Study each table and illustration carefully and ask yourself, "What does this imply?" You should be looking for answers to many questions: What are some of the most likely causes of our national health problems? Are automation and overmechanization involved? Do not expect simple answers; in some cases the evidence is conflicting. There are not enough pieces to complete most of these puzzles, but each piece of evidence presented does somehow fit into the larger puzzle; ultimately all conflicts will be explained on the basis of new and better studies. At present, these conflicts are actually good and essential: they promote further and more careful work that will lead to better answers. In some cases, you may be able to resolve and explain an apparent paradox. In any case, you will be armed with more information

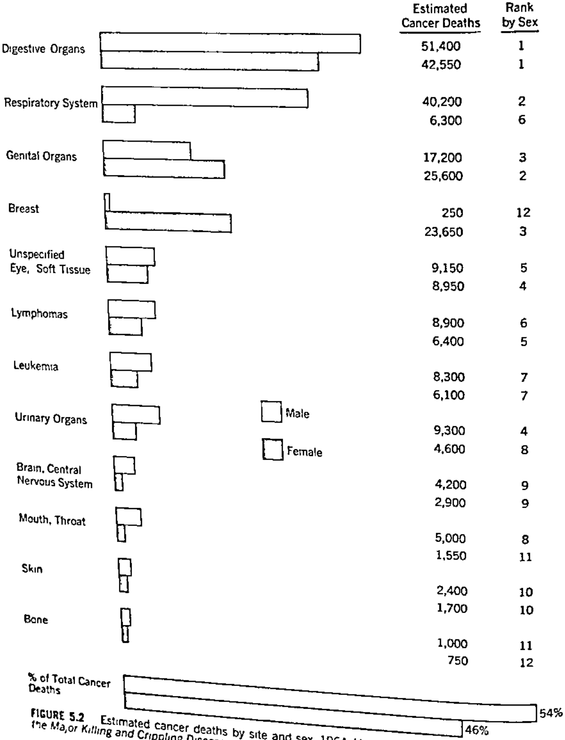



**FIGURE 5.2** Estimated cancer deaths by site and sex, 1964, United States. Data from *Facts on the Major Killing and Crippling Diseases in the United States Today* (172).

with which you can better interpret current and future scientific developments as they are reported, and you should come to a better understanding of our current health status and how it can be improved.

**TABLE 5.1 Selected Causes of Death in the United States, 1900-1965 (Deaths per 100, 000 Population)**

| CAUSE OF DEATH | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 | 1965 |
|---|---|---|---|---|---|---|---|---|
| Major cv—r[a] diseases | 345 | 372 | 365 | 414 | 486 | 511 | 522 | 516 |
| Heart | 132 | 159 | 159 | 206 | 295 | 357 | 369 | 367 |
| Arteriosclerotic heart disease | — | — | — | — | — | 213 | 276 | 287 |
| Cancer | 63 | 76 | 83 | 97 | 120 | 140 | 149 | 154 |
| Influenza and pneumonia | 203 | 162 | 208 | 103 | 80 | 33 | 37 | 32 |
| Diabetes | 10 | 15 | 16 | 19 | 27 | 16 | 17 | 17 |
| Cirrhosis of the liver | 13 | 14 | 7 | 7 | 8 | 9 | 11 | 13 |
| Ulcer | 3 | 4 | 4 | 6 | 7 | 6 | 6 | 5 |
| Tuberculosis | 194 | 154 | 113 | 71 | 46 | 23 | 6 | 4 |
| Bronchitis | 46 | 23 | 13 | 4 | 3 | 2 | 2 | 3 |

[a]Cardiovascular renal
SOURCE· U S Bureau of the Census (578)

**TABLE 5.2 Days of Disability Due to Chronic Disorders, per Year per 100,000 population, United States Average for 1958 and 1959**

| CAUSE | RESTRICTED ACTIVITY | RESTRICTED TO BED | WORK LOSS | SCHOOL LOSS |
|---|---|---|---|---|
| C-v | 269 | 93 | 100 | 6 |
| Digestive | 115 | 42 | 75 | 3 |
| Arth.-rheumatoid | 141 | 36 | 46 | 0 |
| Other | 738 | 236 | 327 | 81 |

SOURCE U S Bureau of the Census (578)

**TABLE 5.3 Average Prevalence of Selected Chronic Conditions, Number per 1000 Population**

| CONDITION | 1957-1959 | 1959-1961 |
|---|---|---|
| Heart disease | 29 5 | 30 2 |
| High blood pressure | 30 8 | 32 3 |
| Ulcer | 14 4 | 15 9 |
| Arth -rheumatoid | 63 9 | 65 6 |

SOURCE U S Bureau of the Census (578)

TABLE 5.4 Selective Service Statistics, Percent Rejected, World War I through 1965

| | WW I | WW II | 1950-56 | 1958 | 1960 | 1962 | 1963 | 1965 |
|---|---|---|---|---|---|---|---|---|
| Rejected | 21 3 | 35 8 | 33.5 | 41.9 | 44 8 | 49.8 | 50 0 | 44 0 |
| Medical only | — | — | 15 7 | 19 0 | 22.1 | 22.7 | 24 0 | 21 8 |
| Mental only | — | — | 13.6 | 18.0 | 18 8 | 21 5 | 21.6 | 18 6 |
| Both | — | — | 3 1 | 3.3 | 2.9 | 3 0 | 3 1 | 2.3 |

SOURCE U S Bureau of the Census (578).

## HEALTH KNOWLEDGE

No discussion of current health status would be complete without some consideration of what kind of knowledge our population has about matters of health. This leads us to consider the question of medical quackery and old wives' tales. To further acquaint you with the problems associated with the public's lack of health knowledge and wisdom, two excellent articles are reproduced here.

### Health Education vs. Medical Quackery*

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BUREAU OF EDUCATION AND VOLUNTARY COMPLIANCE
FOOD AND DRUG ADMINISTRATION

Children learn at an early age that there is a certain amount of dishonesty and fraud in the business world. My 9-year-old son suffered a disappointment bordering on shock when he received a toy he had seen ballyhooed on television. The difference in what he had expected and what he actually got was remarkable indeed. That same youngster has now learned to be wary of the cereal box-top come-ons, after similar disappointments. Come to think of it, he is pretty sophisticated in his small world as a consumer.

Likewise, my teenage son has learned some lessons about gasoline additives to double your mileage and so-called high-powered spark plugs advertised to the high school set. When I was his age, I had no car, but I had freckles. Freckles were not as socially acceptable then as they are now, and I learned a few things about cosmetic advertising after spending several dollars on freckle cream.

If there is any bright side to this kind of experience, perhaps it is simply in the "once burned, twice shy" adage, since such experiences may help to immunize young people against the bigger—and more dangerous—types of fraud they will meet up with as they grow older.

In the health field, we call this kind of fraud and cheating "quackery." The definition is important because by today's usage, quackery refers not only to the quack practitioner but also to the worthless product and the fraudulent promotion.

It is not a life-or-death matter if the teen-age debutante does not get the results she expects from a bust developer or an acne

*From the *Journal of Health, Physical Education and Recreation*, 36 28, 1965, by permission of the American Association for Health, Physical Education, and Recreation.

lotion, or if the tanning preparation used before the high school prom leaves her face covered with orange-red splotches a few days later. But it may be a life-or-death matter if a few years later that same young woman discovers a lump in her breast and decides to try out some quack remedy because she is afraid to tell her doctor about it.

The knowledge of how to seek competent medical advice in such a situation, how to evaluate labeling claims and advertising, books used in promotions, articles in magazines, claims of so-called health lecturers and of house-to-house peddlers, and radio and television promotions—such knowledge may in fact be the most important health education message that youngsters can be taught today. I am not going to presume to tell you as professional teachers how to do your job of teaching. But I think you will be interested in some of our material on the subject of health education as it relates to medical quackery.

These are true-life cases from FDA files. For example, consider the outer carton from a package of Nutri-Bio—a vitamin-mineral preparation containing a number of miscellaneous ingredients such as unsaturated fatty acids, bioflavonoid complex, alfalfa juice, and various minerals and trace elements. Back in 1961 and 1962 Nutri-Bio was promoted with labeling statements that "the American people are the most undernourished people in the world even though overfed" and that Nutri-Bio was of special dietary value because the ingredients were of natural or organic origin.

I mention this type of product first because nutritional quackery is an important subject for teachers, and yet a difficult one because of the well-known atrocious dietary habits of teenagers. This is complicated by the fact that children nowadays have been brought up on vitamins (it used to be cod liver oil) and many of us are conditioned to believe that supplementary vitamins and minerals are an absolute must for everyone if he is to enjoy good health. This is not so!

The fact is that food faddism and nutritional quackery rank as the biggest racket in the health field today. This quackery thrives on the major themes of the food faddists—and the willingness of people to believe them. These are:

1. That all diseases are due to faulty diet;
2. That soil depletion and the use of chemical fertilizers cause malnutrition and poison our crops;
3. That modern methods of food processing and cooking have robbed our foods of their nutritional value; and
4. That anyone who has the "tired feeling" or an ache or a pain is probably suffering from a "sub-clinical deficiency" and needs to supplement his diet with some special concoction.

Nothing could be further from the truth. While there are, of course, special circumstances in which dietary supplementation is necessary, advice of a competent physician is needed to identify vitamin or mineral deficiencies and to prescribe their proper treatment.

The promotion of Nutri-Bio a few years ago provided a classic example of food faddism gone wild. More than 75,000 full and part-time sales agents were selling Nutri-Bio at $24.00 per packet for a six-months' supply for one person. The promotion involved one of the largest collections of pseudo-scientific literature and books ever assembled. Nutri-Bio was being recommended as the answer to practically all health problems—anemia, arthritis, cancer, diabetes, heart troubles, nervousness, and so on. It promised health, beauty, athletic ability, radiant living, and the capacity to stay young and vital. It was even recommended as a cure for juvenile delinquency. The sales distribution plan was based on a chain-letter type scheme and many people

invested their life savings in it, lured by the prospect of quick riches.

When FDA moved in with a court action challenging the promotional claims being made for Nutri-Bio, about fifty tons of the false and misleading literature were turned in by agents at Chicago alone.

The point for those of us interested in consumer education is that foods from the supermarket or the corner grocery are the best source of our nutritional requirements, and there is much, much false information being spread about the alleged values of so-called natural or organic foods, trace elements and other mysterious ingredients. This information comes at us in books, magazines, syndicated medical columns in newspapers, radio and TV advertising and program content, and on labels and in various promotional literature. We must prepare our young people to defend themselves against such nutrition nonsense.

Illustrating another area of medical chicanery is one of the many forms of vibrating devices that have been popular in recent years, the Slenderoll device. This might have appealed to the over-weight teenage girl worried about her figure, because it was claimed to help reduce weight by a combination of massage and vibration. It has rather attractive and suggestive illustrations on its package, and states "Roll away ugly fat," "Ideal as a spot reducer," "Achieve a slimmer figure," and so on.

This device is worthless for these purposes. There is no device that will "spot reduce." The most one could hope to get from vibration and massage of this kind would be a pleasant sensation, perhaps with temporary relief of minor muscular aches and pains. But vibrator devices using this same principle have been sold in the form of hand units, pillows, chairs, and even mattresses —and sometimes with claims for the prevention and cure of serious ailments, including migraine headaches, heart and circulatory conditions, and defects of the bony structures.

The Abunda Beauty device is one that might have appealed to the self-conscious, flat-chested teenage girl worried because she did not fill out a sweater in the same proportions as some of her companions. The plastic cup was to be placed over the breast and the hose connected to the household water supply. Water swirling through a perforated disc in the base of the cup provided a massaging action that was supposed to help enlarge the breasts.

FDA charged in court that claims for this device were false, and the court ordered the company to stop the violation. The promoter was sentenced to serve 30 days, given a $500.00 fine and a one-year suspended jail sentence, and placed on five years' probation.

Some of the devices of this general type are quite capable of causing serious injury.

One of the problems that teachers—and all of us in the consumer education profession—are up against is that people nowadays are conditioned to believe in medical miracles. Some modern medical machines are truly miraculous and life-saving. The quack and the charlatan know this and take advantage of our interest and of the little bit of knowledge we do have. Electricity, magnetism, radiation—all are mysteries to most of us and we are setups for the glib-tongued promoters of even the most worthless gadgets claiming one or more of these properties, especially if they look impressive.

The devices I have demonstrated so far have been do-it-yourself types, but some are also designed for the quack practitioner. They are frequently put up in handsome console cabinets with knobs and dials and lights and electrodes for the patient to hold. Sometimes there is a wall chart to be consulted for diagnosis, using readings from the fake meters. They frequently are sup-

posed to perform both diagnosis and treatment. The practitioner wears a white coat, has some impressive looking framed documents on the wall, and speaks about new scientific discoveries as if he knew what he was talking about.

I have brought one of these professional looking diagnostic-treatment devices with me to show you what they look like. This one is called the Ellis Micro-Dynameter. More than 5,000 of them were sold to practitioners throughout the country for as much as $875.00 each. It is basically a simple device for measuring minute electric currents. The patient was supposed to hold these electrodes and the machine was supposed to detect differences in electrical potential caused by disease. It was supposed to enable the practitioner to diagnose practically every kind of disease, as well as the general health of the patient.

The Federal Courts have ruled the Micro-Dynameter not only worthless but also unsafe for use even by a licensed practitioner, since it does not do what it claimed. FDA caused over a thousand of these machines to be recovered and destroyed.

So—what can we tell our students that will be helpful? Here are a few general guidelines. As for products, first learn the authoritative sources of information, as for example your family doctor, or the American Medical Association, or your state or county medical society; the national (or your city) Better Business Bureau; the voluntary health agencies in the field, such as the American Cancer Society and the Arthritis and Rheumatism Foundation; your city or state health department or food and drug law enforcement agency; and the Food and Drug Administration. Remember, too, that licenses and diplomas can be checked through your county or state medical society.

While these sources can be most helpful, one can determine for oneself simply by asking these questions:

1. Is the product claimed to involve a secret principle or formula or device that no one else has?
2. Does it promise a quick cure?
3. Is it advertised by case histories or testimonials?
4. Does the sponsor clamor for medical investigation or recognition?
5. Does the sponsor claim medical men are persecuting him or fear his competition?
6. Are the recognized treatments belittled?
7. Is it sold by "specialists"—or door-to-door peddlers?

If the answer to any of these questions is "yes"—be skeptical—investigate before you invest!

The Food and Drug Administration's experience in the investigation of medical quackery underlines some important points:

First, that medical problems can be extremely complex, and the layman can easily be mistaken about the value of a drug even when he is convinced by his own experience.

Second, that the annals of medicine are full of the unusual and the unexpected. Statistically the quack is bound to pick up a few cases now and then that make his treatment look miraculous. It takes the most expert medical knowledge to evaluate these properly.

Third, that the layman often aids and abets quackery by giving his testimonial for use in persuading others. He may lead his neighbor to disaster.

And, lastly, tomorrow's breadwinners, homemakers, and heads of families should be given as much knowledge as possible to help them make intelligent decisions in health matters.

Fortunately, today we have a new and stronger law to deal with worthless and falsely promoted drugs. But law enforcement alone cannot deal adequately with quackery. Quackery, of whatever kind, thrives on the combination of ignorance

and fear. It uses misinformation to arouse false hope. Education is the greatest of all weapons against this evil.

Herein lies a golden opportunity, and a moral responsibility, for health education.

In summary, the following list of the ten most common types of quackery is presented. The list is not meant to imply that none of these diseases and problems can be improved or cured, but one should be cautious in accepting this kind of "help" from nonprofessional sources. Investigate carefully!

1. Magic weight reducing schemes (formulas, exercises, food supplements and pills, etc.)
2. Arthritis and rheumatism "easy" cures (from machines to so-called radioactive minerals)
3. Miracle cancer cures (from machines to drugs)
4. Beauty aids (especially for skin, hair removal, hair coloring, and mole removers)
5. Food fads and special supplements ("all ill health is related to diet")
6. Special cures for baldness
7. Alcoholism and smoking cures
8. Wanton use of hormones for various ills and deficiencies
9. Breast development drugs and schemes
10. Cures for tuberculosis, diabetes, influenza, kidney disease, and ulcers.

## Too Much Health*

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Can you hear it sizzle? This one rhymes also: "Early to bed and early to rise, makes a man healthy, wealthy, and wise." Every family has its pet stock of health rules. Some are in blank verse: "Stuff a cold and starve a fever." Incidentally, this one suffered abbreviation with time. Originally it was: "If you stuff a cold, you will have to starve a fever." The shorter form, tho opposite in meaning, had the advantage of brevity. In fact, it makes little difference which one you follow. Both are false.

Too often health rules merely forced the prejudices of one generation on the next. About a generation ago such dogmatic rules began to lose their grip on us; so we turned to science for health facts. Now in place of one health rule, we have a score of statements claiming to be health facts. In a certain midwestern university (name withheld for ethical reasons) product "A" was experimentally proven to be superior for the relief of so-and-so. Conclusive scientific tests have shown that cigaret "Y" is less irritating to rabbits' eyes than all others. Are you bothered with skin blemishes? Take what Peter did and find yourself again successful on the dance floor. Deception in every breath, yet all so factual sounding that the average person is misled.

The era of health facts has brought us a confusion of claims made by manufacturers and advertising experts, all purporting to bring us health in return for a consideration. We are, therefore, being forced into the third era of health education. This is the era of "health reasons." We must learn to ask for the evidence back of a statement. We must develop a mental nose for distinguishing clean facts from moldy tradition

and both from foul falsehood. What are some of the areas of greatest confusion?

Why must everybody eat spinach? Why, except to bring profits to some growers' association, is any one food worthy of universal consumption? The calcium in spinach is useless to man because with the oxalic acid also found in spinach it forms insoluble and, therefore, useless calcium oxalate. The phosphorus content is not important enough to warrant its listing with high phosphorus-bearing foods such as beans, lentils, brazil nuts, cheese, crabs, eggs, fish, liver, meat, and milk. As a source of iron it is no better than apricots, beans, beets, broccoli, eggs, heart, kidney, molasses, wheat, oysters, and many others. Yet how many protesting children have been stuffed with this unnecessary weed! Why must everybody drink orange juice when tomato juice and all fresh, green vegetables are good sources of vitamin C?

Is white bread harmful? Advocates of brown breads who answer yes are placed in a ridiculous position by the facts. In the milling of white flour much of the mineral and vitamin content of the wheat kernel is removed; but that does not convert what is left into a poison. The simultaneous consumption of vegetables and meats compensates for such shortages where laws ensuring the use of *reinforced* flour do not operate. Doubly swindled are those who decline white bread for the more righteous-appearing rye bread. Ordinary rye bread has had just as much of the mineral and vitamin values removed. There is no virtue in the dark hue of the rye kernel in spite of such ignorant jingles as, "the whiter the bread, the sooner you're dead."

Some decry eating proteins and carbohydrates at the same meal. To follow this most irrational edict literally would mean starvation. Milk, meat, potato, wheat, and almost every food found in nature is composed of varying amounts of proteins, carbohydrates, and fats. Separation is artificial.

Then there is the mother who returns from the lectures of some self-appointed apostle of natural living to run her home on a new dietary order that revels in celery, orange, carrot and prune juice, plus plenty of nuts and cooked vegetables – but no meat. A purely vegetarian diet if carefully selected will not harm, in fact it can sustain perfect health. Hinhede of Denmark reported keeping his gardener healthy for six months on a diet of potatoes, margarine, and water. Later it was found that the six months were not consecutive; but even if this had not been misleading reporting we could say it proved very little.

The meat interests of this country kept two ex-arctic explorers in perfect condition on a pure meat diet for an entire year. Among 158 outstanding Swiss athletes there was not a single vegetarian. In the midst of such conflict, what is the course of sanity? If we look into a man's mouth, we find sharp teeth for tearing, side by side with flat molars for grinding. The former belong to flesh eaters, the latter like those of the horse spell readiness for vegetables and other grasses. If we look to the digestive tract for advice, the answer is the same. In herbivores the digestive tube is almost endless (about 100 feet in sheep). In carnivores it is short (about 15 feet in the dog). Man's tract-length is intermediate (about 30 feet). Vegetables require a long time for digestion, hence a long tube, whereas meats are digested adequately in a much shorter tube. Our entire insides bear witness to the reasonableness of meat *and* potatoes.

From the senseless notions of diet quacks it is just one fool's length to the more dangerous pronouncements of the shysters who have made America bowel-conscious. One need but tune his radio to be persuaded during those critical after-breakfast mo-

ments of surer acting laxatives, of sweeter tasting ones, or of ones that are especially suited for persons, who already past 35 years, cannot be expected to withstand the more highly explosive charges contained in the ordinary kind. Some have names which sound more natural in reverse. Perhaps therein lies also a suggestion for their method of administration.

At the other end of the line are those who advocate the internal bath. Why not? How vivid the need of passing a quart and a half of cleansing water, with or without salt or soap, in thru the back door of the digestive tract. Such large quantities of water distend the bowels to proportions that make them insensitive subsequently to the pressure effect of the normal bowel content. There is also danger of driving the putrid fecal mass from the large intestine where its presence is harmless back into the small intestines where its absorption may injure health. These many "aids to nature" are, in fact, no kindness. A wiser course would be to lay off a day or two from incessant artificial stimulation to give nature a chance to catch up and strike her own pace under the influence of a sensible diet.

But to wait a day or two without a bowel movement seems criminal to the millions who, trembling under the threat of the poisons of auto-intoxication, nervously clock themselves to daily regularity. It may allay their ungrounded fears to know that the medical literature contains many instances of persons who live happily with weekly or semiweekly movements, while more rarely weeks transpire between bowel action.

What is the nature of this monster "auto-intoxication" who stalks the peace of mind of millions? In the first place, he is virtually nonexistent. There is no absorption of putrid poisons from constipated large intestines. What then is the cause of the headaches, the irritability, and the bleary eyes that in some people accompany constipation? When a balloon is inflated in a man's rectum or when a wad of cotton is inserted, he experiences all of the symptoms above described. It is all a reflex effect initiated by a distention of the rectum. Whether this distention is due to food residues or to a rubber balloon makes no difference in the symptoms. Their instantaneous disappearance when this pressure is reduced is further evidence of a reflex effect rather than a chemical poisoning, for how could poisons leave the body so promptly?

More or less regular bowel movements are still desirable; but it is no more necessary to worry about poisons. It is entirely safe in most instances to wait for water, applesauce, sauerkraut, and other bulky foods plus exercise to exert their effects in the way intended by nature long before the advent of lax-lax.

Strenuous exercise injures the heart. This is another absolutely groundless statement. From a study of hundreds of autopsy records, it is now possible to say that never has a *healthy* heart been damaged by exercise, no matter how strenuous. Even the rare cases of acute cardiac dilatation recover perfectly. Far different, of course, may be the fate of a previously diseased heart when it is subjected to the strain of exercise. The *athlete's heart* is superior in every way. With each beat it may expel twice as much blood as can the untrained heart. Consequently, it need not beat as frequently. The heart of Lash while running pumped so much blood that he was able to absorb over five quarts of oxygen per minute; the untrained individual does well to absorb about half this amount. That is why Lash was world's champion in the two-mile. Sudden cessation of training has never been shown to be harmful in spite of the scores of so-called authorities who claim the contrary. The enlarged heart of a highly trained athlete becomes smaller after the training season. Fatty degeneration of the heart has

nothing to do with exercise or the lack of exercise. But when a man breaks training, he may suddenly return to his tobacco and other dissipations which do injure his health. This plus of deleterious habits is only fortuitously connected with the breaking of training and must not be confused with it. Many animals have been put in and out of training abruptly. *Never has it harmed them to stop suddenly.*

*Is it O.K. to drink water with meals?* Earlier views held that it was harmful because the stomach juices were thereby seriously diluted. Experimentation has proven that water is one of the best stimulators to stomach secretion. Digestion is improved. Shall athletes avoid candy and other sweets while in training? The answer is *no!* A diet rich in all kinds of carbohydrates is favorable to the economic operation of muscles. It does make sense to eat sweets in their natural form, such as honey, maple syrup and raisins, and this for two reasons. In their natural form sugars are accompanied by vitamins and minerals that assist their metabolism in the body. Also, the *bytaste* in these natural forms tires one's taster so that there is less danger of overeating.

Is there any danger in eating at irregular *times?* The traditional three square meals a *day is purely a matter* of convenience. Much *more sensible* would it be to eat whenever *we become hungry.* For young children and *certain adults five, six,* or seven light meals *per day would* be more effective.

*Never eat shrimp* with strawberries, milk *with fish, or starchy* foods with acids. All *such statements* are groundless. Any foods *that are enjoyed singly* may also be taken in *combination. Try it.*

*Another favorite* among health barkers *is acid stomach,* to be cured by various ex*pensive forms of* baking soda, with or without bubbles. A stomach ulcer or even a *tumor* may be the cause, but more commonly it's excessive drinking, *smoking or* worry. Anger, anxiety *and love all paralyze* the stomach. The *"nervous stomach" is* also a by-product *of every national crisis,* a big *football game, or a family quarrel.*

*But it has nothing to do with acidosis, which is a much rarer condition of the blood caused by faulty* body chemistry, as in *diabetes.*

Don't try to correct your "acid stomach" by avoiding foods which taste sour. In fact, *acid fruits actually contain so much sodium* that their end effect in the body is to alkalinize it. Starches and fats also cannot contribute to acidosis. Proteins, whether of plant or animal origin, may; but this is entirely harmless. It would be better if you never thought about acidosis—you probably don't have it and worrying about it may give you *heart burn.*

Have we too much health? We certainly have too much talk about it. I dare say many Americans really have no idea how they themselves, alone and unassisted, really feel. How can they know? They barge into the new day under the stimulation of caffeine-laden java. Soon they deaden their jangled nerves with nicotine. From half past afternoon until late at night their irritated minds find solace in alcohol. At headache time an aspirin gives them escape. Bubbling alkalizers remove yesterday's brown taste to make room for today's.

If foodless and matchless, John Doe would some day walk thru the woods, upon tiring sit by a stream to straighten out his cockeyed thinking, then when hungry pass up hamburger stands and taverns and turn homeward to a plain wholesome dinner, and after helping with the dishes, play with the kids or otherwise occupy himself with socially constructive work, he might be surprised with himself. It might take several days, but eventually he would find that it feels good to be *John Doe with* a clean mouth and lungs, *to be John Doe*

without war news of stomach versus intestines, to be John Doe with mind and emotions at peace with the world. To be John Doe, alive and healthy, uncramped by artificial aids, would give him a feeling as priceless as it is costless.

### SUMMARY: CURRENT HEALTH STATUS

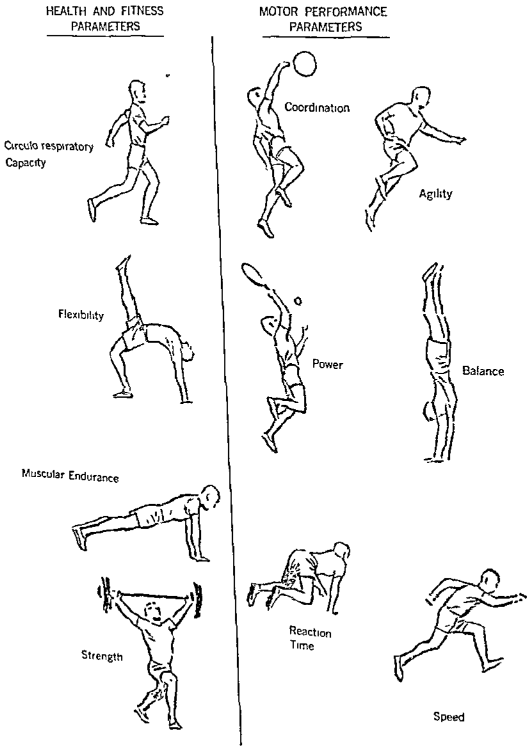
Study the tables and articles carefully. Are the facts and statistics worthy of national concern? Are there technical explanations that eliminate any real health implications? For example, what factors complicate the statistics on increase in heart disease deaths, or cancer deaths from 1900 to 1965? It should be obvious that the facts and statistics we have cited cannot, alone, give us absolute answers, but with the proper analysis they can indicate certain trends in health status. Important questions can be asked. For example, with improved diagnostic and therapeutic methods, why has heart disease steadily increased since 1900? Unless there has been a radical change in autopsy technique and the mechanics of reporting the cause of death such that simply *more* deaths formerly attributed to other causes have progressively been reported as due to heart disease, then this increase in coronary deaths must be carefully and methodically studied and researched. Thus, one can see that the constant analysis of health statistics and surveys is an important and vital step in man's battle with and prevention of the degenerative diseases.

More important, such statistics help us to see that, in spite of improved medical techniques and medicines, the health status of our citizens is not improving. The picture is certainly not as rosy as we would like it to be, and because much of our poor health is preventable, it is a legitimate cause for concern; the statistics certainly have important implications for the need for better health education. Physical educators and recreation personnel must also stand ready to prepare themselves to more effectively play their roles in the drive to improve our national health status. To many of you it may not be clear what these roles are or how important they are; you must have an adequate foundation upon which your understanding of these roles may be built (and that is one of the major purposes of this book). Make no mistake about it; once you *have* this foundation, if you are a professional, your role and its importance will become clear!

## PHYSICAL FITNESS

### MISCONCEPTIONS AND THE DISTINCTION BETWEEN PHYSICAL FITNESS AND MOTOR ABILITY

The term *physical fitness* is included in many familiar test batteries commonly used in the schools. In many cases, the inclusion of *fitness* in such titles is a most unfortunate error and one that logically could account, at least in part, for the current apathy of some people toward total personal physical fitness. This is not an indictment of "physical fitness" test batteries. Most of the batteries are excellent and include tests that do have some definite value, but


HEALTH AND FITNESS PARAMETERS
MOTOR PERFORMANCE PARAMETERS
Coordination
Circulo respiratory Capacity
Agility
Flexibility
Power
Balance
Muscular Endurance
Strength
Reaction Time
Speed

in the physical fitness category because they relate to his health and well-being.

One should also consider the point of view supported by Yost (623) and others: many accidents "can be prevented through possession of the qualities which describe the totally fit individual." One of these qualities is physical fitness, and since better agility, speed, reaction time, and coordination might better prepare a person to avoid certain kinds of accidents, some would include these qualities as physical fitness elements rather than separate them out and label them primarily motor ability elements as we have done. This is a theoretical issue but is of considerable importance. Our position is that we should certainly strive to promote attainment of higher levels of general motor ability for better skill performance and for the sake of safety, but that, since it is highly questionable whether these general traits can be significantly improved, they should not be labeled physical fitness elements. This is in keeping with our contention that any reasonably healthy person can make dramatic and significant gains in physical fitness level if the effort is made. At any rate, it is certainly *imperative that each person understand exactly what each of these qualities is.* This understanding might very well be the basis for acceptance of a sound personal health and fitness concept. It is also important that a fully educated person know whether and why each parameter is necessary for optimal physical fitness. Some of the subsequent chapters of this book are devoted to this end.

**FIGURE 5.3** Distinction between health and fitness parameters and motor ability parameters.

## PHYSICAL FITNESS PARAMETERS

### Circulo-Respiratory Capacity

This parameter, circulo-respiratory (CR) capacity, is more commonly called circulatory or circulo-respiratory fitness, which allows the individual to persist in strenuous tasks for periods of some length. The limit of persistence in such tasks is determined primarily by the functional capacity of the CR systems, and is specific to the various kinds of tasks and the work intensities. It is difficult to measure CR capacity with great precision because of the obvious importance of motivational factors involved in "quitting" a strenuous task. There are, however, objective ways of measuring this quality, methods that minimize the individual's subjective decision as to when to "quit." Standardized bench-stepping tests are often used as a measure of CR capacity (see page 210).

The important point in this particular discussion is that CR capacity is important in health and fitness. Nearly all people with a normal systemic health base, and even many without, can dramatically improve CR capacity with a reasonable amount of energy expenditure. As surprising as it may seem, even cardiac patients can make dramatic gains in CR capacity through appropriate exercise programs. The degree of

desired attainment should be based on the individual's needs and his systemic health base. As discussed in Chapter 8, improved CR capacity may also be an important factor in the *maintenance* of the systemic health base by means of helping to prevent degenerative changes in the heart and circulatory system.

### Muscular Endurance

Muscular endurance is sometimes erroneously referred to as "strength." This quality, hereafter called ME, involves the capacity to persist in localized muscular effort. The physiological limit for this functional quality is apparently localized in the muscle group itself and is not determined primarily by the failure of the CR systems to supply oxygen. Again, the need for this quality is specific to the individual. It is not possible to measure ME with great precision because of the same problem associated with measures of CR capacity: the motivational factors involved in "quitting."

It is not difficult to evaluate muscular endurance grossly, however. This quality is commonly measured by such standard tests as pull-ups, sit-ups, and push-ups. It is obvious that there are other muscle groups of importance and that a high degree of attainment in these typical tests is not necessary for every person. It is apparent that certain levels of muscular endurance are needed, and that this is another quality that must be included if *optimal* physical fitness is to be achieved. Important and specific relationships of ME to health and fitness are discussed elsewhere in this chapter.

### Flexibility

Flexibility is a component of physical fitness that pertains to the functional capacity of the joints to move through a normal range of motion. It involves the muscular system as well as the bones and joints; lack of adequate flexibility has often been linked with low back pain as well as with muscle and joint injuries. It is commonly measured by such tests as toe touching and back curls, but these typical tests assess the range of motion in certain specific joints only. As with CR capacity and ME, this quality can be strikingly improved in the person with an adequate systemic health base. There have been some claims that lack of range of motion is causally related to subsequent development of rheumatoid arthritis. Although the two are obviously related once the disease has set in, there appears to be no scientific foundation to support the contention that lack of flexibility actually causes this arthritic condition.

### Muscular Strength

In discussing strength, it is important that we recognize two current misconceptions about this common term. First, strength is not necessarily synonymous with the size or the so-called definition of the muscles, although there is little question that people with large and well-defined muscles are usually physically strong. The emphasis in health

and fitness is not on "looks," but *functional* capacity and individual needs. Second, strength is quite often confused with muscular endurance (see Chapter 9). The measure of true strength is the maximal amount of force that a muscle or muscle group can exert. It is not properly measured by determining the maximum number of repetitions of a certain activity, such as push-ups or sit-ups; for example, the strength of a beam in a house is not measured by how long it stands but rather by how much weight it can support, although we might expect these two characteristics to be related.

Maximal strength is evaluated by determining the maximal one-effort force. "If" and "why" we need strength will be discussed subsequently. It will suffice now to say that a minimal level of strength is obviously necessary; without it, one cannot function or even move about normally. Strength gains, for most persons with a normal systemic health base, can be dramatic.

## MOTOR PERFORMANCE PARAMETERS

### Coordination

*Coordination* is probably the common *denominator* of all motor performance parameters. It involves the nervous system and the skeletal-muscular system and may be defined as the "smooth flow of movement in the execution of a motor task." We would be hard pressed to argue that minimal, general coordination is not required by everyone. But beyond a minimal, "normal" level of coordination—and this argument holds for all the remaining motor performance parameters—we maintain that, for most people, *a gain in this quality is not essential for improving health.* There are exceptions to this. A football player's health, for example, depends partly on his coordination: he may be physically injured unless he has better-than-average motor coordination. But most people, provided they have just minimal coordination, can *improve* their physical fitness level tremendously without improvement in coordination. It should be noted that we are speaking here of the gross motor coordination involved in large-muscle skills, such as walking, and not of the fine, "microscopic" coordination that may well account for gains in strength and muscular endurance. Certainly an improvement in the coordination of shoveling dirt or snow would improve the efficiency of that task and make the weekend yard job easier, but our argument is that improved levels of coordination are not *required* for physical fitness gains.

### Balance

The complex quality called balance is actually a specific kind of coordination involving reflexes, vision, the "inner ear," the cerebellum, and the skeletal-muscular system. *Static balance* involves equilibrium in one fixed position, whereas *dynamic balance* refers to the maintenance of equilibrium while moving. Common tests involve the use of the balance beam, various ways of standing on one foot with eyes open or closed, the use of electronic

devices for measuring "sway," and so on. We maintain that for the average person little or no improvement beyond "normal" balance is needed for gains in physical fitness.

## Power

Power involves one of the basic fitness parameters—strength—but adds another factor—speed of contraction (see page 263). It is measured and exemplified by activities or movements of an "explosive" nature, such as the vertical jump, the shot-put, the ball-throw for distance, and the "leap" of the dancer. Power is certainly a necessity for most athletic activities if the performer is to "survive" and excel in his particular sport. To enjoy successful participation in recreational games, such as badminton, tennis, handball, softball and golf, it is normally desirable to have some of this "power." Except for some sports skills and possibly some home-centered work activities, it is conceivable that a person *can* improve his physical fitness level without increasing his power. Obviously, many occupations require "power" of some sort; for the people in these jobs, this item should be placed in the list of health and physical fitness parameters.

## Agility

Agility is generally defined as "the ability to change directions quickly and effectively while moving as nearly as possible at full speed." In ballet, modern dancing, and some folk dancing, agility also means a quick and efficient upward or downward move. This quality may be essential to success in certain sports but hardly needs to be developed to a *high* degree by most persons, who do not participate in contemporary dance or in high-agility sports, or by one who participates only for "recreation." Such an individual can develop a high level of physical fitness—based on individual needs and interests—assuming only minimal agility. The common tests of this parameter involve such tasks as the zigzag run for time through a maze of obstacles (see page 306).

## Speed

Speed of specific and localized movement, more properly called movement time, has been discussed under "Power." What we commonly refer to as speed is the kind measured by *total* body movement from one place to another, usually at least for a distance of fifty yards. The relative need for this quality is rather obvious: some need it, but most people do not. For them it is not a requisite for the optimal level of physical fitness.

## Reaction Time

Reaction time is the length of time required to *initiate* a response to a specific stimulus. It is essential for the good shortstop in baseball, the football lineman, the wrestler, the fencer, and so on. It is also critical to the girl who suddenly looks up to find herself under a

falling brick! Normal levels are certainly important, but beyond this, one need not develop extremely fast reaction times to become healthier and more physically fit.

## SUMMARY: THE DISTINCTION BETWEEN PHYSICAL FITNESS AND MOTOR ABILITY

In order to clarify our viewpoint concerning the difference between physical fitness and motor ability, the following points are offered in summary:

1. Only qualities essential to health and/or work capacity should be classified as components of physical fitness.
2. Qualities primarily essential to skill and motor performance, and not to health, should not be classified as physical fitness components but, rather, as motor performance or motor ability qualities.
3. Physical fitness components, then, are CR capacity, muscular endurance, flexibility, and strength.
4. Motor performance components are coordination (their common denominator), agility, speed, power, balance, and reaction time.
5. For a given *individual*, the above categorization may not hold true.

# CURRENT LEVEL OF PHYSICAL FITNESS IN THE UNITED STATES

## RESEARCH EVIDENCE

Limited data are available on physical fitness levels of children and adults in the United States. Tabular data of these kinds are meaningful only to the extent they make one aware of conditions that call for attention. Is physical fitness a national concern today? It is our belief that physical fitness is most properly a personal matter; however, population averages and statistics, along with experimental data, may help you as a professional to reach a decision about general physical fitness status. A sampling of the applicable evidence is presented here. No attempt has been made to slant the evidence or its implications; evidence is presented in a straightforward and simplified manner, much of it in the form of simple tables or graphs. In short, this is a problem-solving chapter. You can draw your own conclusions for each exhibit and, if you wish, read further by going to the references cited.

Obviously an exhaustive presentation of all pertinent data is impossible. Additional current information is readily available to the interested student and should be secured in order to substantiate or contradict conclusions based on the evidence presented here.

The alert reader will find newspapers and news magazines as well as professional journals valuable sources of recent scientific information.

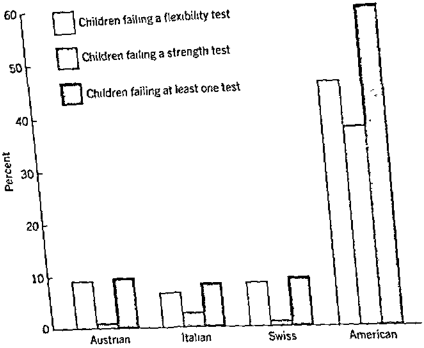
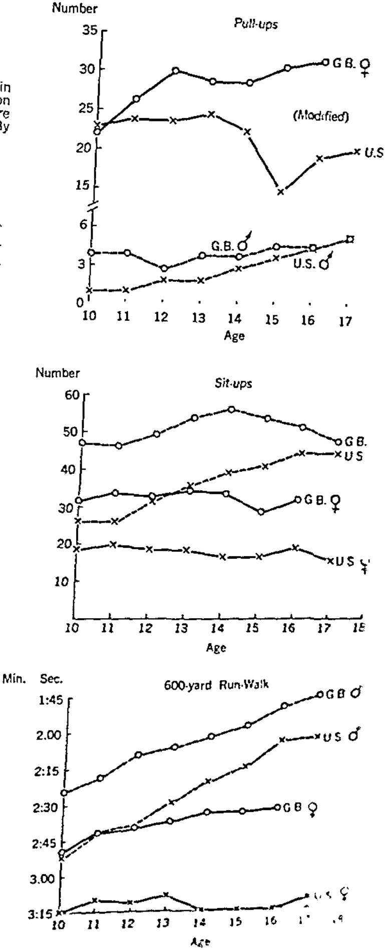



**FIGURE 5.4** Comparison of European and American children on the Kraus-Weber Minimum Muscular Fitness Test (measures of minimal strength and flexibility) Adapted from Kraus and Hirschland (325)

Figures 5.4 and 5.5 portray the results of studies comparing the fitness of youth in the United States with other countries. In addition, Knuttgen (316) reported in 1961 that 70 percent of the Danish school boys' scores and 86 percent of the girls' scores exceeded the American mean scores on the AAHPER Youth Fitness Test. Ikeda (263) reported in 1962 that Tokyo children scored better than Iowan (U.S.A.) children in pull-ups (boys), bent-arm hang (girls) and the grasshopper (a test of endurance) while the Iowan children scored better in sit-ups. Sloan (524) tested a limited number of college students (sample size ranging from fourteen to twenty-eight per group and not randomly selected) and found that the English men and women physical education majors he tested had significantly higher mean fitness indexes than their counterparts in a North Carolina university (as did the English sophomore nonmajor men and women when compared with their North Carolina counterparts). South African male physical education majors were also significantly superior to their counterparts at the North Carolina university.

A comparison of the muscular and CR endurance tests of the AAHPER battery in 1958 and 1965 is presented in Figure 5.6.

**FIGURE 5.5** Comparison of boys and girls in *Great Britain (GB) and the United States (US)* on the AAHPER *Fitness Test items that measure* muscular and circulo-respiratory endurance. By permission from Campbell and Pohndorf (93).




Isolated bits of information also provide some insight. Cooper (124) recently reported that of 3544 men between the ages of 17 and 35 (mean age was 24.3 years), only 27 percent could cover 1.5 miles within twelve minutes. This figure was increased to 70 percent after six to thirteen weeks of a regular, progressive exercise program. In a 1953 study at a large Eastern university only 53 percent of 132 male college students tested could climb to the top of a twenty-foot rope, and 11 percent could not even get off the floor. In another study in 1962 (549) only 28 percent of 28 tested could make it to the top (14 percent could not get off the floor).

## PERSONAL OPINION AND OPINION BASED ON FACT

In order to objectively survey the fitness status of our country, we should also like to expose you to information other than the graphs and statistics just presented. We are presenting several articles that seem appropriate. Some are not favorable to physical fitness in that they question the importance of the *stress* placed on physical fitness; all include pertinent facts and ideas that are worthy of your consideration in the process of taking a thorough look at the status of physical fitness in this country.

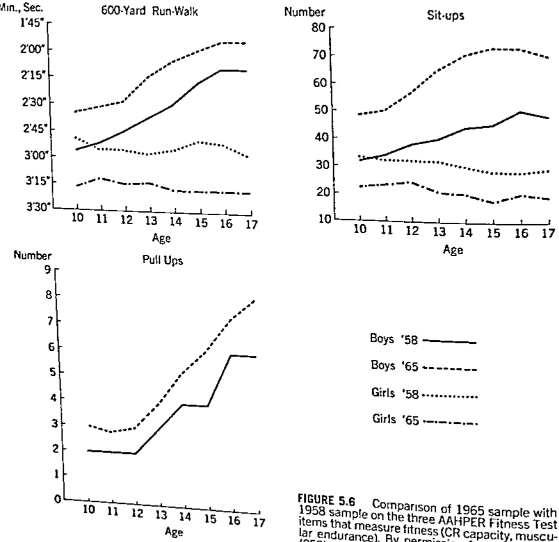



**FIGURE 5.6** Comparison of 1965 sample with 1958 sample on the three AAHPER Fitness Test items that measure fitness (CR capacity, muscular endurance). By permission from Hunsicker (259).

In reading these articles, you should be alert to:

1. Confusion of terms basic to the issue; for example, *athletics* and *physical fitness* used as synonyms
2. Tongue-in-cheek expressions of opinion that may actually be attempts at "reverse psychology"
3. The use of satire, humor, dramatic appeals, isolated cases, and so on, to distract from and gloss over the facts
4. False statements, statements out of context, omission of facts, half-truths, and "stretching" and misinterpreting facts, and the clever and deliberate confusion of fact with opinion

**FIGURE 5.7** "There's nothing wrong with our fitness, Gramps. We're just tired."

## Fits Over Fitness*

**GEORGE A. SILVER, M.D.**
CHIEF OF THE DIVISION OF SOCIAL MEDICINE
MONTEFIORE HOSPITAL, NEW YORK

There is a wild and rather high-pitched call for more muscle as the prime need of Americans. Sandwiched between dire warnings of the Communist menace, democracy's difficulties in Africa and Asia and the need for protection against nuclear holocausts, are constant pleas for developing the American biceps. To this end, the American Association for Health, Physical Education and Recreation has been set up as a department of the National Education Association; the American Medical Association has appointed a consultant body on physical fitness; there is the President's Council on Youth Fitness, which runs frequent advertisements in the daily press (complete with flags) with the help of the Advertising Council and the Newspaper Advertising Executive Association.

The advertisements urge parents to invade the next P.T.A. meeting to press for the adoption of vigorous school programs to improve physical development. Our children are weak and helpless, it is said; we are falling behind the Europeans, the Japanese, even the aboriginal Australians, in physical condition. Get off your backsides, spectators! Exercise! Get into active sports! Build up your body! Prepare yourself!

For what?

*"Fits Over Fitness," *The Nation*, June 9, 1962, p. 515. (Reprinted by permission of the publisher).

it, Democracy will crumble and our lives will be shortened, sickly, depressed.

What is physical fitness? What is its relation to health? What is health? Is participation in athletics an aspect of physical fitness? Does one have to perform physical activity of a regular kind in order to be physically fit? Are athletes healthier than non-athletes? Are we really below par physically, as a nation?

The National Education Association reported that the physical condition of American youth is a "real cause for national alarm." The statement derives from a number of findings. For example, Hans Kraus, who invented the term "hypokinetic disease," gave European and American children a group of tests for muscular fitness. Only about 10 percent of the European kids failed to pass all these tests, whereas 100 percent of American kids failed. In one test, fewer than 2 percent of European children failed, while over 35 percent of American children failed. (For the benefit of those seeking black marks against their public-school system, it should be pointed out that the American private-school children approximated the European school children in their performance.) In another instance, tests showed that arm strength for Japanese girls was 18–47 percent greater than that of our girls.

To the viewers with alarm, this is incontrovertible evidence of muscular incompetence

There are gloomy correlates. Jerry Morris, an English epidemiologist, has shown that heavy workers have a lower death rate than light workers, and that coronary disease is twice as frequent among sedentary as among active workers. Everyone knows how sedentary we are today. Some psychiatrically-oriented muscular apologists have concluded that the combination of neurosis and muscular deficiency produces painful tension symptoms like low-back pain, lumbago and even tension headaches. At West Point, Appleton showed that of the cadets discharged for psychiatric causes, an undue number had scored low in their entrance physical-aptitude tests.

And, of course, the gloomiest statistics of all are from Selective Service. Of 3.7 million men under twenty-six who were examined for the draft, 1.7 million were rejected as physically unfit for fighting.

Most often named as the causative element of declining physical efficiency of the American people is the "civilization" package: automobiles, television, progressive education. It is noteworthy that when Brig. Gen. S. L. A. Marshall testified before a Congressional committee, defending our youth against attack as weaker than their soldier ancestors at Gettysburg or the Alamo, he was forced to admit that "We're a nation that has become flabby in the legs. The automobile has done this to us. As the legs grow weaker," he added ominously, "we lose a certain amount of our 'moxie.'"

The power package that is supposed to put us back in the running as healthy muscular models for the world includes daily exercise and lots of competitive sports.

The emphasis on active sports has no real relevance. Men with very seriously impaired health have been known to be excellent athletes: I give you the number of diabetic tennis stars in the American Davis Cup Team as an example. And a study of Air Force cadets revealed that those who had recently been discharged from hospital for various upper-respiratory diseases did better in physical-fitness tests than enlisted men in good health who had not been in hospital. Jokl, another writer in this field, noted: "Few erroneous ideas are so deeply rooted among the public as that of physical training promoting health. Physical training is a procedure capable of improving efficiency, but incapable of improving health." The case of a champion sprinter

who developed tuberculosis two months after winning the championship, and died less than a year later, is good evidence that ability to perform outstandingly in athletics is no indication of health.

A well-developed body does not mean health. An appalling number of psychoneurotic and psychotic individuals have sound bodies. One might ponder the mental health of some of the characters who decorate the books and magazines on muscular development, or some of those you see sunning themselves and developing their muscles in the various beaches and gymnasiums of the American scene.

Physical fitness does not provide immunity to disease. In epidemic times, the physically fit are stricken as often as those who aren't. (Physical fitness certainly does not seem to protect against venereal disease.) It is argued that children who are physically fit, and take regular gym exercise, show a better attendance record in school. I doubt if it means that they are healthier. It may simply mean that children who compete in school athletics may be a little more reluctant to absent themselves or to report sickness. In any case, the relevant statistics are contradictory. In some states where data are available, the incidence of illness among school athletes is exactly the same as among nonathletes.

Last winter the papers reported the death of a fifty-year-old man after taking a swim in the icy waters of the Charles River in Boston. As a member of the local Polar Bears Club, he had been chopping into the ice and jumping into the water every year along with his fellows. Presumably, his fellows will now be discouraged from these activities, but I doubt it. Newspapers constantly report the coronaries that follow upon snow shoveling, tennis matches and quick games of touch football in which some of our older citizens seem to feel that it is necessary to engage in order to demonstrate their physical fitness. Health departments have taken to publishing warnings to the citizenry in winter *not* to shovel snow. (Hire those weak high school kids!)

And as a final note, before we go on to a consideration of what this all may mean, it should be pointed out that although a third or more of the young people who came up for Selective Service were rejected as physically unfit for military duty; this doesn't necessarily mean that they were physically unfit in the generally accepted sense. It means that they had visual defects, or defects of hearing, or hernias (and I am not sure that exercise is a modern treatment for hernia) or some defect due to poliomyelitis or congenital absence of a muscle, or shortness of a leg or arm—none of which is curable by exercise and none of which unsuits them for normal life.

It is difficult to take issue with the laudable objective of most of the physical-fitness proponents, but some sense needs to be put into their data. Peter Karpovich, one of the saner advocates of physical fitness and currently president of the American College of Sports Medicine, has written, "There are two main stumbling blocks to the definition of physical fitness: one, the relation of physical fitness to health; and the other, the consideration of what constitutes a physical-fitness test." Karpovich goes on to say that physical fitness is a "fitness to perform some specified task requiring muscular effort."

This definition gets us somewhere. Karpovich very sensibly notes, "The ideal goal is to be sufficiently fit to accomplish each day's work with a minimum of fatigue and to remain active to a good old age." If you need soldiers, then they should be able to crawl under barbed wire and climb mountains and do all the various things that soldiers have to do under difficult field conditions. Certainly a much greater degree of

muscular competence is required of them than of the writer of this article, who needs a degree of muscular activity sufficient only to hold down the button on the dictating machine.

What do we learn from all this? I would say that a great deal of the energy that is being spent on physical-fitness programs is really designed to improve the condition of the experts and the specialists in the field rather than of the citizenry. I have no doubt that after an individual takes moderate exercise of one kind or another, he feels better and possibly sleeps better. This feeling of well-being should be encouraged. Given the fact that different individuals have a different inheritance of muscular ability and different degrees of muscular coordination, different kinds or amounts of exercise are desirable. There is no such thing as a physical-fitness program applicable to everyone. For many individuals, their normal daily activities may be quite adequate.

There is no evidence that without some type of organized athletic activity or physical-education program, people will be unhealthy or die young or be unprepared to carry on their life work satisfactorily. Equally, there is no evidence that a physical-fitness program will protect against illness or against sudden death. This kind of reckless propagandizing and pamphleteering should be discouraged.

A great deal of scientific investigation remains to be done on the effect that muscular exercise—including athletics—has on the human body. Some of this is now being carried on, particularly in England, and *The Journal of Applied Physiology* makes information on the subject available. The best measures of physical fitness today relate to capacity to do work. Oxygen utilization as a measure of physiologic efficiency is widely accepted as significant, and there seems to be some evidence that short periods of training, with not too severe physical activity over a period of time, will improve the rate of oxygen consumption.

The British investigators tend to be critical of the classical tests of physical fitness because the training is not comparable to what is done in life. There is no relationship between various muscular tests used and the actual physical-fitness training programs. Furthermore, most of the statistics now in vogue have been derived without control groups, from small numbers, and under such conditions that the numbers themselves must be seriously questioned. Among the research programs that should be carried out are those that would help to define "training" and "exercise." Do these mean a season of athletics each year for every individual, and if so until what age? Do they mean playing tennis or handball or some comparable sport daily? Further research is needed to determine what is meant by *keeping* physically fit. How long do you have to take exercise, over what period of time, and what happens after you quit, in this business of staying fit?

I suspect that in addition to this research, there ought to be some exposure of the quacks in the field who are milking Americans of huge sums of money for exercise courses, posture and exercise classes and devices supposed to improve muscular efficiency.

We might also debunk the theoretical substructure relating to the inactivity of the mass of Americans—these car-riding, television-viewing, inactive blobs of fat and jelly. It should be pointed out that more sports equipment is being sold today than ever before: there are more swimming pools, more basketball courts, more gymnasiums and swimming pools in the public schools, and more people participating in sports than ever before in our history. If anything, it is not cars and TV, but the social conditioning separating the rich from the poor, the minorities from the majority,

that tends to hold down the number of sports participants.

If there is such a thing as physical fitness, it isn't related directly to muscular competence, but rather to the ability to carry on one's life work competently and with personal satisfaction. Sports should be engaged in for the pleasure they give—not as strenuous competitive efforts to "keep fit"—and with a judicious eye toward reducing the strenuousness as we grow older. Moderation, please! And paradoxically, perhaps the *more sedentary one's occupation, the less energetic* should be the exercise one takes. As the playgrounds and swimming pools are opened to all, including the slum children and the Negroes, the natural activity available may be all any of us need—except for an occasional *Peace Walk* or *Freedom Ride.*

## Rx for Health: Exercise*

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By many physicians, especially by those of us who are interested in physiology and health as well as in disease, physical exercise is considered to be just as essential for the best health as are rest and sleep, food, one's job, recreation and peace of mind. Sometimes, however, one hears remarks, usually made by those habituated to a very sedentary life and to more or less obesity, that one can live quite happily and healthily to a ripe old age without taking any exercise at all. It is true that adequate statistics on this point about exercise seem to be lacking, although life insurance and other figures clearly indicate the harmful effect of obesity both on health and longevity. Some fat people do exercise a lot but most do not, and it is unusual for an athlete who continues to exercise vigorously to become very fat.

Despite our unsatisfactory knowledge about the possible beneficial effects of exercise on longevity and on health, we do know of certain advantages of exercise which are not always adequately appreciated, and it is on these that I would like to comment briefly.

It may be said, however, at the outset that several follow-up studies have shown that vigorous exercise in youth, and later in life, too, in healthy individuals does not cause harm, barring accidents, or shorten life. A book entitled "University Oars" written by John Morgan, a physician, himself an oarsman, and published in 1873, showed slightly better than average longevity and health for members of the Oxford and Cambridge crews who took part in the annual races from 1829 to 1869. I myself made the same observations in a long follow-up study of Harvard College football players of the teams from 1900 to 1930.

It may be true that the mesomorphic (broad muscular) athlete is an earlier candidate for coronary heart disease than his ectomorphic (skinny), or endomorphic (rotund) contemporary, but it is also possible that the maintenance of vigorous physical exercise throughout life with the avoidance of obesity may protect such a mesomorph from a serious degree of coronary atherosclerosis (patchy degenerative changes in the walls of the arteries) early in life or in middle age. We have as yet inadequate knowledge about that very important possibility.

Now let me present what we do know. First, there are the immediate physical effects of exercise on the circulation of blood. Good muscle tone in the arms and particularly in the legs, resulting from regular ex-

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ercise, maintains an improved circulation of blood in the veins. Actually, since the veins have valves, which when in good condition prevent the blood from going the wrong way, the compression of the veins by the skeletal muscles helps to pump the blood back to the heart, thus decreasing stasis (a slackening of the blood flow).

Soft, unused muscles do not accomplish as good a job, and make clotting (thrombosis) in the veins more likely also, as when one sits for a long time in an airplane, or after an operation or any illness which keeps a person in bed or inactive for a long time. It is best on long trips by plane or train or automobile to get up or out and walk a bit at intervals to combat this tendency. Thrombosis in the leg veins can on occasion have serious consequences when some of the clot (embolus) breaks off and blocks an important blood vessel in the lung (pulmonary embolism).

An interesting experience suffered by an aged friend and patient of mine, then 103 years old, illustrates the value of the exercise of simple walking in controlling a stasis in the leg circulation. He had had the grippe in midwinter and was housed for two or three months. While he sat about waiting for spring, both legs began to swell with no symptoms of pain anywhere or of breathlessness. When I saw him in the early spring he was discouraged, bored and apprehensive about the dropsy. Examination, however, showed that his heart was not responsible, nor any actual thrombosis, but simply a very sluggish circulation and the effect of gravity in an aged person. Instead of medicine, the resumption of his regular exercise of walking, up to a mile or two a day, was prescribed and within a week or ten days the leg swelling disappeared. Now, three years later, he continues to be in excellent health.

In addition to its beneficial effect on skeletal muscle tone, exercise also improves the tone of the diaphragm, which results in its better function as the piston of a pump, not only for bringing a full supply of oxygen to the lungs with removal of carbon dioxide but also for the suction of blood into the heart via both inferior and superior *venae cavae* (great veins). Vigorous exercise is best for this, but if an individual is unable to undertake such activity, deep breathing exercises several times a day are of definite value. Of course, it is always wise also to avoid restriction of the motion of the diaphragm by excessive abdominal fat.

Another part of the circulatory apparatus helped by exercise is that of the smallest blood vessels, arterioles, capillaries and venules, which are rendered more active in their function by their response to regular exercise. The peripheral vessels of the hands, the feet and the ears react beneficially with less likelihood of sluggishness and stasis.

Thus it is evident that although the heart is, of course, the main agent in maintaining the circulation of blood, the aid it receives from these other structures is considerable and may indeed on occasion mean the difference between good health and physical unfitness.

Let us turn now to other beneficial effects of exercise which are often overlooked. In the first place, the course of human existence does not always run smoothly. Not infrequently in the lives of all of us emergencies arise which demand a fully efficient circulation with reserves, not just a sluggish one that is adequate for a sedentary life only. An accident or an illness or operation may test to the full the resources of the body, and it is probable that the difference between a state of positive health and a state of mere existence—although not diseased—may mean the difference between life and death.

Digestion, when meals follow exercise and do not just precede it, and bowel function are improved by exercise. Not infrequently vigorous sport renders laxative medicine quite unnecessary. Sleep is favored, too; in fact, a brisk long walk in the evening may be more helpful as a hypnotic than any medicine, highball or even television show.

Finally, and I believe most important of all, there is the beneficial effect of exercise on the nervous system and the psyche. Here is the reverse of the effect of mind over matter or psyche over soma. The importance of somatopsychic physiology and medicine has not been adequately appreciated. It has been said that a five-mile walk will do more good to an unhappy but otherwise healthy adult than all the medicine and psychology in the world. Certainly it is true that in my own case nervous stress and strain can be counteracted and even prevented by regular vigorous exercise; it is the best antidote that I know.

It matters little, if at all, what kind of exercise it is, provided it suits the strength and liking of the individual concerned. It is well to establish a regular habit and to maintain it through thick and thin. One should regard it as just as essential to good health as eating, sleeping and working.

An intense mental worker needs exercise to keep his mind clear, and it is well if mental concentration can be alternated frequently with exercise or even accompanied thereby, as was the common custom of the peripatetic philosophers in Athens in the days of its prime.

A few hours before I wrote these lines in a plane while returning home from Greece, I had the privilege of exploring the Agora in Athens with Prof. Homer A. Thompson, director of the American excavations there. We promenaded along the reconstructed stoa where once the great statesmen and philosophers had walked while teaching and discussing problems in many fields. They had doubtless themselves discovered that their minds were clearer when they kept moving to bring more blood to the head and more oxygen to the blood. It would be well for the present generation to return to some of the good habits of our ancestors for the restoration of better physical and mental fitness and for their maintenance.

Now a word as to specific forms of exercise. It is my strong belief that all healthy persons, both male and female, should exercise regularly, no matter what their ages. Of course, in advanced age—that is, past 70—it is doubtless wise to exercise less strenuously than earlier in life, but no strict rules can be set. Every person must be considered individually according to his condition, habits, preferences as to the kind of exercise and the circumstances of his life. Some healthy, vigorous persons in "good training" can play tennis, even singles, in their seventies and golf in their eighties. John D. Rockefeller and Adelbert Ames were golfers together when both were in their nineties.

Other types of exercise that can be recommended for healthy older persons are long walks, swimming, fishing, skiing, moderate hunting, bicycling, snow-shoveling, gardening, woodcutting, horse-shoe pitching, less strenuous gymnastics and curling. Milder games may suit some individuals, such as croquet, shuffleboard, bowling on the green and archery. Stairclimbing, though a dull exercise, and calisthenics are not infrequently of some use, too. Doubtless, persons with much muscle, especially men, can and should exercise more vigorously than those with less; in fact, to maintain the best of health this may be necessary.

In the case of persons who have an important but not crippling disease, cardiac or otherwise, mild exercise may still be

advisable for the sake of the maintenance of health, but each one must be carefully considered individually by his or her physician and so advised. Instead of forbidding exercise like golf in the case of a person who has had coronary thrombosis—whether or not it has left a scar—but who is free of symptoms, the establishment of a habit of regular exercise is usually an important part of the treatment. Of course, in the presence of symptoms of importance the exercise should be limited, but even in such cases some sort of exercise is usually advisable, even if only short walks or light gardening, or deep breathing.

And, of course, it is not sensible for a person, even if very muscular, suddenly to take on some unusually strenuous exercise without working up to it gradually. It is always wise to get into a conditon of so-called training gradually. But it is time for us at all ages to be more than spectators of the sports of the day. We should expand our physical activity beyond that of getting into and out of automobiles and riding in elevators, buses, trains and planes. A return to the use of our legs is to be highly recommended.

There may be more truth than poetry after all in a letter in verse which the poet John Dryden wrote to a kinsman in 1680. One of the stanzas in that letter went as follows:

## No Thanks, I'll Just Sit This Out*

LOIS MARK STALVEY

I'm about as physically unfit as I can manage and I intend, happily, to stay that way. For a while, I felt guilty about it, but reading between the lines of recent research has convinced me that I'm on the right track and I plan to go on, through the years, as sedentary as life allows.

As I carefully combed through an article by a famous doctor, certain phrases popped out . . . "We have no statistics to prove this, but it *seems*. . . ." and "A survey of the 1912 varsity hockey team's present health was *not conclusive*."

See! They *think* exercise *ought* to be good for you.

Well, I've developed my theory, too . . . while others are tramping around golf courses, I've used all that extra time thinking.

As far as longevity is concerned, they admit there are no measurable facts to prove athletic types live longer. On the other hand, we sloths might. You sure can't drown, ski into a tree or get kicked by a horse if you're sitting home reading *The Group*.

There are other ways of departing this life besides hardening of the arteries and, although hiking in the mountains is supposed to keep your arteries loose, it looks to me as if you'd run a good risk of getting bitten by a snake or falling off that darned mountain, flexible arteries and all!

From the viewpoint of the female, I can see many advantages in simply sitting, with your legs crossed gracefully, while some

*"No Thanks, I'll Just Sit This Out," *The Sunday Bulletin Magazine*, October 27, 1963. Reprinted with permission from the author and *The Sunday Bulletin Magazine*. Copyright 1963 Bulletin Co.

other girl gets her face all red chasing a tennis ball. First of all, the athletic girl is likely to develop strange bulges and bumps called muscles. Now, this may be great if you're a Soviet woman, assigned to hoisting cases of caviar onto government trucks . . . and I won't stoop so low as to accuse physical culturists of subversive sympathies . . . but, as for me, I'm the capitalistic type and aspire only to look as weakly decadent as a fashion model.

And if you develop muscles, you're liable to be tempted to *use* them. As it is, everyone knows I couldn't possibly tote that couch or lift that chair, so I just give advice and suggestions.

If I were capable of opening windows on trains, I might just go ahead and do it, thereby depriving some men of a feeling of superiority and, Heaven knows, they're complaining enough about *that* already!

My exercise is provided by a sievelike mind that keeps me running up and down stairs after things I forgot on the first trip. This is enough to use up my daily caloric intake and keep my dress size down.

My husband suggests I could occasionally violate my pro-lethargy policy by walking when we're going to a neighbor's party three or four blocks away. "Good exercise," he says. Standing solidly on his flat-soled oxfords, he has never really been able to understand my attitude . . . that walking four blocks in party heels is not exercise, it's the kind of unproductive self-torture practiced by those Indians who sit on nails.

Instead, I have a loyalty to the American economy and the persistence of Henry Ford that makes me cling stoutly to the automobile. If everyone walked when they could drive, what would happen to the annual earnings of gas and tire companies? Mr. Ford didn't spend all that time tinkering in his drafty Dearborn garage just so we could buy English bikes and go puffing up hills to the grocery store.

As long as no one has proof that exercise is the key to an unused health insurance policy, I'll continue to lump it in with the other superstitions such as walking under ladders and not petting black cats on Friday the 13th.

I will also ignore those who view-with-alarm the unfitness of American youth. My kids are fit enough to climb trees to fall out of. Anyway, dedicated inventors have been busily creating a modern life where our children will need even less physical prowess to exist than we do. As to muscles for national defense, it would almost be a cheering thought to believe our country would be defended by physical combat rather than the monstrous weapons unleashed by a finger or a button.

I have no desire to picket the country's gymnasiums, plow up tennis courts or drive water-ski sales into the hands of bootleggers. Let those who want muscles grunt away. I'm usually far enough away from any sports event so I'd never hear them.

I'm just declaring myself and warning those who'd lure me onto a golf course with appeals to my esthetic side. "But you'd enjoy the scenery," they say. Nonsense! You've got to tramp around, getting all scratched up by some of that scenery, hunting for the golf ball you're committed to keeping your eye on. If it's all the same to you, I'll sit on a park bench, enjoying the same kind of scenery without the burden of sock-and-seek!

Until the advantages of perspiring heavily in bowling alleys are established as irrefutable health requirements, apathy will continue to appeal to me. I needn't even query our family doctor . . . he's a nice chubby type whose spare time exercise is bridge!

So far, the only positive effect they've established is that increased physical activity steps up the circulation of the blood. Who knows if wildly circulating blood is

necessarily good for you! For my taste, I prefer the serenely flowing type. It certainly *sounds* much healthier than catapulting corpuscles taking artery corners on two wheels.

However, if all those experts who would have me touching my toes and slipping my disc with push-ups will promise to sit down and think this whole fad over, I'll try to buy one of their precepts . . . that deep breathing caused by exercise increases the oxygen in our blood. I won't even ask them to prove that air in your blood is desirable. If they'll leave me alone I promise, faithfully to *breathe* . . . in *and* out . . . for as long as I live.

And while I'm breathing, I'll just sit comfortably, if you don't mind, giving loads of sympathy to my sunburnt, ski-injured, muscle-strained friends.

You supply the vigor, please, and I'll supply the Band-aids!

## Exercise and Fitness*

Fitness for effective living has many interdependent components involving intellectual and emotional, as well as physical, factors. These differ in relative importance from one period of life to another, depending on varying individual roles and responsibilities. But in every part of life, each of these factors is significant.

Fitness rests first of all upon a solid foundation of good health. Be it in the home, on the farm, at the office, in the factory, or in military service—fitness for effective living implies freedom from disease; enough strength, agility, endurance, and skill to meet the demands of daily living; sufficient reserves to withstand ordinary stresses without causing harmful strain; and mental development and emotional adjustment appropriate to the maturity of the individual.

Fitness does not come in a "have" or "not have" package. The level of fitness attained is a resultant of ability to cope with the varied and interacting stresses of life. *Optimal* fitness permits a person to enjoy life to the fullest. In addition to the day's ordinary work requirements, one should still have enough vitality to enjoy avocational interests, and to meet special challenges that may interrupt the daily routine. In emergencies of various types, sudden and unusual physical demands may be laid upon individuals and groups. The possession of physical strength, agility, and endurance may enable the individual or group to survive, whereas the lack of fitness may spell catastrophe.

The upper limits one can achieve in fitness are determined largely by inheritance. However, the extent to which the individual develops his own potential for fitness depends on his daily living practices and exercise habits. Adequate nutrition, sufficient rest and relaxation, suitable work, appropriate medical and dental care, and the practice of moderation are also important in maintaining fitness.

This report, however, is intentionally limited to the contribution of exercise in the total program of fitness. Points of special emphasis are, *first*, that the body is responsive to training and, *second*, that the body operates under wide margins of safety and is remarkably resistant to strain.

Increased availability of labor-saving machinery and easy modes of transportation have changed modern living. As a result, more and more persons tend to lead sedentary lives. The increased leisure time

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*A statement on the role of exercise in fitness by a joint committee of the American Medical Association and the American Association for Health, Physical Education, and Recreation. Reprinted from *The Journal of the American Medical Association*, May 4, 1964, Vol. 188, pp. 433–436. Copyright © 1964 by American Medical Association.

that accompanied these changes can be merely a continuation of this sedentary existence, or it can be the opportunity for regular, enjoyable exercise. The active nature of young children has not changed, but unless they continue this inclination later in life they will not maintain their level of fitness.

## PHYSIOLOGICAL FACTORS

In essence, the greatest effect of an exercise program is the improved organization of the body functions which support activity. This improved physiological efficiency is reflected in increased endurance, strength, and agility.

The oftener the normal heart and circulatory system are required to move blood to active regions of the body, the more efficient they become. This is accomplished chiefly by improved muscular tone of the heart, an increase in its output of blood per minute, and an increase in the number of active capillaries in the lungs. Protracted exercise improves the work of the lungs by increasing their ability to expand more fully, take in more air, and utilize a greater proportion of the oxygen in the inspired air. Games and sports involving extended running, vigorous swimming and dancing, and other sorts of forceful effort serve this purpose. Activities of this type involving leg muscles also help to maintain good circulation against gravity through a "milking" or "squeezing" action of the muscles on the veins. This benefit cannot be achieved by any other means.

Prolonged inactivity, on the other hand, results in a decline in circulatory and pulmonary efficiency.

The ability of the body to function according to purposeful patterns is vested in the central nervous system. With practice and training, many complex movement patterns become second nature and almost automatic. The nervous system can adapt itself to permit proficiency in an almost unlimited variety of physical activities.

An individual's ultimate performance is limited by the physiological capacity of the body systems involved. Subjective factors such as a feeling of breathlessness, general weakness, or muscular discomfort evoke reduction or cessation of activity. These are part of the body's mechanism for protection and survival, although they can also reflect inhibitions of a psychological nature. Usually the untrained individual reduces or discontinues his performance long before physiological limits are reached —when he feels slight fatigue or fears overexertion.

The untrained person can increase his tolerance for exercise by following a regular regimen, but under ordinary circumstances he still will not approach his physiological limit of activity. Repeated periods of *intensive* exercise, however, alternating with light exercise or rest, enable the well-trained person to overcome these inhibitions and experience the phenomenon known as "second wind." This represents an adjustment of the physiological reserves of the body which temporarily banishes fatigue and enables the individual to continue his activity with renewed vigor.

A distinction should be made here between healthful fatigue and harmful exhaustion. Exercise which regularly approaches physiological limits—coupled with adequate rest—results in the development of increased strength and endurance. The term "fatigue" usually connotes this principle. By contrast, exercise carried to the state of *exhaustion* may do harm, particularly to the unconditioned individual. This is especially likely to happen if there is insufficient time for recovery after fatigue.

The voluntary muscles become stronger when they work against gradually increas-

ing loads. Activities requiring relatively short bursts of intense effort such as lifting, pulling, pushing, climbing, jumping, and speed running tend to increase muscular strength.

In a sedentary existence, or where physical activity is not diversified, certain body muscles may not develop sufficiently. These underdeveloped muscles may be needed for unanticipated work activities, sports activities, or, as in the case of the muscles along the spine, for the continual support of the body. Various forms of prescribed activities can be used in training programs to overcome muscular weakness. These activities usually take the form of selected conditioning exercises, including calisthenics, which employ the weaker muscles as well as those which are used more frequently.

Much attention has been given recently to *isometric* exercises, to which some persons attribute gain in strength in shorter periods of effort than are needed for the traditional *isotonic* exercises, and for which no special apparatus is required. In isometrics, a vigorous muscular contraction is sustained for a brief period without producing movement; in isotonics, muscular contraction produces a range of movement of body parts. Since isometric exercises have no beneficial effect on range of motion, and present difficulties in motivation, they should be considered as only part of an exercise regimen. Neither isometric nor isotonic exercises improve circulatory endurance unless involved in a total activity that taxes the cardiovascular and pulmonary system.

The potential for muscular strength increases throughout childhood and adolescence, usually reaching a maximum in early adulthood. In the 30's or 40's most individuals experience the onset of a gradual decline of strength, endurance, and agility. The heart and circulatory system also tends to exhibit lessening of functional capacity for exercise and resilience in recovery after exercise. The extent and rapidity of this decline is partly dependent on exercise habits in adult life. The beneficial effects of exercise are transient; persons who continue to train retain their capacities longer than those who neglect training. Individual differences, dependent on constitutional disposition and basic organic health, affect the rate of decline of strength and endurance.

## INDIVIDUAL AND ENVIRONMENTAL FACTORS

There is a considerable range of individual variation in need and capacity for exercise. A physically active person may need little, if any, additional exercise to maintain fitness, whereas an inactive, relaxed person must add exercise to prevent becoming less fit. Some individuals, even at an early age, recover poorly from breathlessness and general fatigue after exercise. In some, unfavorable emotional reactions are also noted. Attempts to modify these responses through planned exercise should proceed carefully under medical supervision. Such persons frequently cannot reach the levels of fitness achieved by those to whom exercise is an exhilarant and a stimulant.

Advanced age, in itself, is not a contraindication to exercise, but is actually an indication for it. Precluding accidents, a healthy person of any age will do himself no permanent harm by suitable physical activity. Moreover, exercise that has been specifically selected and prescribed is needed for convalescing and disabled persons.

Evidence as to the effect of exercise on digestion indicates that physical exertion does not necessarily interfere with the digestive process. Strong emotion may do so even unaccompanied by exercise. Laborers and farmers customarily work hard immediately after meals. On the other hand, it has been found advisable for athletes to

eat their pre-game meals three or four hours prior to competition. Otherwise, the time of day for exercise may well be in accord with personal inclination, hours of leisure, and other determining circumstances.

Vigorous outdoor exercise under conditions of high temperature (over 80°F [>26.7° C]) and high humidity (80%–100%) should be limited to short periods of about one hour, with rest intervals and planned intake of small amounts of fluids. If such conditions of climate can be anticipated, extra salt may be added to food at mealtimes. Acclimation is also involved in significant changes in altitudes. Participation in activities requiring endurance often produces feelings of discomfort at high altitudes. Until adaptation is achieved, the intensity and duration of activity must be reduced.

When averages are considered, there are measurable differences between the sexes in heart capacity, muscular strength, and skeletal proportions. In planning exercise programs for groups, these differences should be taken into consideration, and activities planned for girls and women may well be less strenuous than those for boys and men. However, the range of physical capacities in individuals of each sex is much greater than the average differences between sexes. In the case of individuals, therefore, sex is less significant than constitutional capacity, personal inclination, and physical condition in determining the suitability of any strenuous activity. To a very great extent, social custom may determine the appropriateness of specific activities for either sex.

No harm to normal menstrual function has been shown to result from vigorous exercise. In fact, exercise can be beneficial in relieving certain types of menstrual pain which are common in young women. Whether exercise is continued as usual should depend on the individual's menstrual experience and reaction to physical activity.

## EXERCISE AND HEALTH

Belief in the healthfulness of regular, suitable exercise, previously based on tradition and logic, is constantly being bolstered by evidence from research. As far as can be determined at the present time, the study of the life histories of those who maintain a relatively higher degree of fitness through the nature of their work or through other activities seems to indicate that they suffer less degenerative disease and probably live longer than those who follow a sedentary life.

Obesity, muscle atrophy, cardiovascular inefficiency, joint stiffness, and impairment of various metabolic functions are possible effects of prolonged inactivity. Sudden cessation of work activity in older individuals, as sometimes happens on retirement, often seems to lead to rapid physical degeneration if no substitute activity is provided. The successful use of physical activity in the medical management of patients indicates the beneficial effects of exercise in preventing or delaying organic disease and degeneration.

Exercise, regardless of its nature or extent, cannot provide immunization against infectious illness nor cure communicable disease. The benefits of physical activity are more clearly observable in their relation to certain organic diseases. Regular exercise is now considered to help retard the onset or further progress of diabetes, for example, and man's most common threat to health—atherosclerosis.

There is no longer any doubt but that the level of physical activity does play a major role in weight control. Maintaining a good caloric balance between dietary intake and energy output requires a sound approach

to both food consumption and exercise. There is some evidence to suggest that exercise has a beneficial effect on metabolic functions that combat obesity, in addition to burning calories. The high mortality rate associated with being overweight suggests that obesity contributes to organic degeneration.

The relation of physical activity to mental health should not be overlooked; from this standpoint, the ability to be engrossed in play is basic. Pleasurable exercise relieves tension and encourages habits of continued activity. In fact, muscular effort is probably one of the best antidotes for emotional stress. Fortunately, such a variety of activities is available that everyone should be able to find some from which he gains pleasure as well as exercise.

## EXERCISE SUGGESTIONS

The following suggestions will be useful in deriving the maximum enjoyment and benefit from exercise:

1. A program of exercise should be started at an early age and be continued throughout life with certain adjustments from time to time as life advances and needs, interests, and capabilities change.
2. The amount of vigorous exercise that is desirable each day is largely an individual matter. Recommendations range from 30 minutes to an hour daily as a minimum.
3. Something of interest for every individual can be found to make exercise satisfying and enjoyable. In addition to numerous sports, the variety of choices includes daily habits such as walking, bicycling, and gardening.
4. Hard, fast, sustained, or highly competitive games and sports should not be played by persons of any age unless these persons have attained an appropriate state of fitness through systematic training.
5. All persons should be shown by medical examination to be organically sound before training for competition or other strenuous exercise. The examination should be repeated periodically and whenever special indications appear.
6. An individual in good physical condition may appropriately participate in an activity that might be harmful to another person of the same age who is not in a comparable state of fitness.
7. Persons who are out of training should not attempt to keep pace in any vigorous sport with persons who are properly conditioned and accustomed to regular participation in that sport. Being in condition for one sport does not always mean that a person will be in condition for another.
8. Persons long out of training, or "soft" (who have not practiced strenuous exercise regularly), will need an extended period of conditioning to facilitate gradual return to full activity.
9. A person's ability to recover quickly after physical activity is a good indication as to whether or not the exercise is too strenuous. If breathlessness and pounding of the heart are still noticeable ten minutes after exercise, if marked weakness or fatigue persists after a two-hour period, if a broken night's sleep is attributable to exercise, or if there is a sense of definite and undue fatigue the following day, then the exercise has been too severe or too prolonged for that person in his present stage of training and physical strength.
10. Medical supervision of the amount, type, and effect of exercise during convalescence is essential.
11. Persons should not compete in body-contact sports or activities requiring great endurance with others of disproportionate size, strength, or skill. If risk or injury can

be controlled, carefully supervised practice periods against such odds may occasionally be warranted as a learning device for gaining experience or improving performance.

12. Sports involving body contact or traumatic hazards necessitate the provision of protective equipment. Such protection is especially important for the head, neck, eyes, and teeth. Other activities should be substituted when adequate protection cannot be provided.

13. Careful preparation and maintenance of playing fields and other arenas of sports are essential to reduction of injuries and full enjoyment of the activity. Competent supervision and proper equipment are necessary for the same reasons.

## SUMMARY

1. Exercise is one of the most important factors contributing to total fitness.

2. The contributions of exercise to fitness include a sense of well-being, and development and maintenance of strength, agility, endurance, and skill in persons who are organically sound. Active games, sports, swimming, rhythmic activities, prescribed exercises, and vigorous hobbies all can make distinctive general contributions to fitness.

3. Each individual differs in his capacity to enjoy and benefit from participation in exercise because of constitutional variations in body size, strength, and structure as well as differences in genetic mold, previous experience, and present condition.

4. One must continue to exercise in order to maintain fitness. The nature and severity of the exercise should be graded according to age, individual reaction to activity, and the state of the person's fitness. After age 30, more frequent medical evaluation of the individual's capacity for exercise is imperative.

5. Activities for girls and women should be selected with regard for their psychological as well as physiological characteristics. Those which involve grace and rhythm, and which have a minimum of body contact, should be favored. Regularity of exercise should be stressed, with activity continued, if it is well tolerated, during the menstrual period.

6. Systematic training for any activity contributes effectively to fitness. The conditioning program involved in preparation for athletic competition contributes as much or more to fitness as does participation in the sport itself.

7. Time and care taken to condition the body for sports and athletics through appropriate activities will improve enjoyment, up-grade performance, help prevent injury, and increase the ability to continue participation over a period of years.

8. Consideration must be given to unfavorable environmental conditions of weather and climate. Modification of one's exercise regimen may be necessary, or, in other instances, sufficient compensation can be achieved by modification of dress and diet.

9. The proper use of protective equipment is essential to safe and effective participation in certain sports. Competent supervision, careful maintenance, and proper control of facilities also will help to prevent accidents and reduce injuries.

10. The rules of the game or specifications for play in an activity are made to protect participants and to enhance enjoyment. They should be properly interpreted, scrupulously observed, and vigorously enforced.

11. The vigor and regularity with which an individual participates in an activity will modify his fitness more than the particular activities or events in which he elects to participate.

## Fitness and Creativity*

There can be little doubt that, in most respects, our educational system is one of the finest in the world. Yet there are two very serious deficiencies which all too often result from this system. In dealing with college students, I find these two deficiencies most alarming because they are both qualities which are found almost without exception in normal pre-school children. I refer, of course, to *creativity* and *physical vitality*

These two qualities either are lost naturally as part of the aging process, or our formal education process stunts their growth. If we assume the former to be the case, then we no longer need concern ourselves with the problem. If, however, we consider the latter to be true (and the evidence strongly points in this direction) then we had best put considerable effort into correcting this detrimental and unfair outgrowth of our educational system.

The primary purpose of this paper is to present critical points leading to a logical expansion of the basic concepts of creativity and physical vitality. These points will be presented as briefly and as clearly as possible. It is *not* the purpose of this paper to review all of the research pertinent to creative vs. conditioned learning, early vs. late learning and the benefits of regular activity However, where there is evidence pertinent to the major points, reference will be made to representative research and where there is little or no evidence, this too will be pointed out. It should be made clear that I am not implying that creativity will automatically spring from physical fitness; neither will creativity lead to fitness. But handled properly, the two may complement each other and become a part of the total school effort to effect a gradual improvement in these two qualities in our society.

1. *Two qualities essential for optimal human existence and growth, ability to think for one's self and physical vitality, are too often lost between birth and early adulthood.* High school and college students are conditioned to "regurgitate" that which has been given to them. This is the format which carries over even to many of our graduate schools. Many high school and college instructors even take pains to teach and emphasize that which has been done traditionally, and they actually frown upon new ideas and approaches.

There is concrete evidence regarding the lack of physical vitality. To cite one classic example of the many studies which reveal this lack, British boys and girls 10–18 years old were far superior to their U.S. counterparts in all but one test of fitness. They showed greater shoulder girdle strength, superior agility, greater abdominal endurance, leg power and circulatory endurance. (2)

2. *In certain developmental tasks, creative learning (problem-solving) is superior to conditioned learning.* Animal experimentation indicates that conditioned responses are not always the most efficient. For example, a group of rats were taught a specific, rather complicated route through a maze to a food compartment. Another group of rats, left to their own devices, found a way to make the trip in *less* time and also showed more ingenuity in opening the door latch, using either their paws or their noses while the conditioned group invariably opened the door latch with the same paw. (6) There can be little doubt that things in which we participate ourselves are more meaningful and are more apt to remain "with" us.

*Caution:* We must be careful not to attempt to swing the pendulum too far in

the direction of creative learning. There must remain certain basic principles which are more effectively learned by non-creative experiences.

3. *The "mind" and the "body" are not two separate entities.* The mind is not a magic, mystic, non-physiological "thing." It is composed of cells just as our muscles are. It requires glucose and oxygen to function and hardly qualifies as a thing apart from our body. True, it is complex and difficult to understand, but it is a part of us, not at all physiologically dissimilar to other important organs.

From a less basic point of view, one must feel well in order to think well. The most brilliant mind must be housed in a reasonably healthy, efficient body in order to function optimally. As Schopenhauer has so aptly stated it: "The greatest fallacy is to sacrifice health for any other advantage." (3)

Further evidence of the unity of mind and body is presented by the alarming increase in psychosomatic disorders. Emotional stress can cause actual physical disorders such as hypertension (high blood pressure with no apparent cause), ulcers, chronic diarrhea, and colitis as well as certain skin diseases. (11) It is rather obvious, then, that we cannot separate mind and body.

4. *The schools can best contribute to the realistic objectives for fitness and vitality by:*

A. *Teaching the skills of attaining and maintaining fitness.* All students should be exposed to methods of attaining this physical vitality which is so necessary to health and happiness. They should learn these methods based on their individual needs and not be merely taught to play softball, basketball, etc.

B. *Facilitating the development of concepts of fitness.* It is even more important that students should be guided toward a thorough understanding of *why* this physical vitality is important. This means a rather thorough understanding of principles of mechanics (as applied to the human body) and the physiology of exercise and techniques and principles of relaxation as related to mental, emotional, and physiological fatigue.

C. *Teaching recreational "emotional-release" skills.* On the basis of the need for recreational skills for emotional release, we must teach and teach well the carry-over skills which can meet future needs in this respect. There is evidence that well adjusted people have more hobbies and participate more intensively than do the less well adjusted.(9)

5. *Logical thinking and research support the concept that "early learning" is superior to late learning.* Educators have observed that children can learn languages more effectively than can adults. There is the old saying: "You can't teach an old dog new tricks." Much work needs to be done in this area, but there is evidence to support that position of the superiority of early learning over late learning. Both co-twin control studies and animal studies have indicated the importance of early learning. (1, 4, 5, 7, 10)

Attitudes toward fitness and personal ability have been developed long before we reach children as teenagers in junior and senior high schools. But these attitudes most often result from "hit or miss" experiences in primary grades, entirely non-directed. Poor experiences and unsuccessful competition have led many youngsters to the firm conviction that they are physically inept and cannot participate in anything "physical." Physical activity, then, is actually unpleasant to them as teenagers and this compulsion to avoid public exposure in a physical activity often lasts throughout life.

*Caution:* We cannot assume that early learning is an irrefutable "law" of learn-

ing. We must keep in mind that for a given developmental level there is a level of difficulty which cannot be effectively surpassed. (8)

6. The strong interrelationships among the foregoing bases strongly indicate the feasibility of programs of *creativity through physical education* or vice versa—*vitality through creativity*.

It is extremely difficult, if not actually impossible, to deny the value of a sound body for a sound mind. In a biological sense exercise is secondary in importance only to eating and sleeping, yet the techniques and concepts of proper exercise and fitness are seldom offered in our present educational system. What little physical education that is offered is reserved until the formative years are long past—in high schools and colleges we must then actually conduct "deficiency" or "rehabilitation" programs. If exercise is second in importance only to eating and sleeping, why do we fail to begin scientific foundational instruction in its techniques at the primary level? Is this not the proper time to develop important life-long concepts? Do we wait until junior high school to teach mathematics or English? Yet, which would most adults be willing to trade off, their ability to solve trigonometry problems or their physical health?

The answer is rather obvious. The primary grades are the grades where such concepts can be most effectively nurtured; and effective concept development means for the most part problem-solving—not conditioned learning!

Students can be taught to set up their own activity programs on the basis of sound physiological and mechanical principles. For an example of how creative expression can be developed in physical education, the reader is referred to an excellent article by Professor Hope M. Smith. (12)

7. *Every elementary school in this country must meet these needs by allotting the instructional time and providing the personnel trained in this "new" physical education program.*

Obviously this article or talk about this problem will not solve it. We must act in two directions. First of all, time must be allotted for this work, preferably beginning in kindergarten. When the job has been properly done, we can then eliminate required physical education from the colleges and offer only advanced skill classes at the high school level.

The trained staff person is quite another matter. Either an elementary teacher will need to attend summer workshops in elementary physiology of exercise and body mechanics or qualified physical education graduates with this kind of training and this kind of philosophy will need to be hired.

The Department of Physical, Health and Recreation Education at the University of Toledo has made definite changes in its program in an attempt to instill this philosophy and to teach the techniques of instruction in elementary body mechanics and physiology of exercise. There are courses in elementary physical education and techniques of fitness instruction required of all physical education majors and minors. Similar material on a more advanced level is presented in a graduate level course. We must get people into the field who are aware of the acute needs and who can implement these programs.

The need for *creativity and vitality* has been pointed out on the basis of certain principles of learning (early learning, creative learning, unity of mind and body, realistic objectives for school physical education). On the basis of this need for physical fitness and the ability to think for one's self, the following is strongly recommended: All elementary schools should have at least

one full-time person, trained in health and fitness, who will incorporate the problem-solving approach as much as possible into the following three-point physical education program:

1. Teach the techniques and skills for attaining and maintaining fitness.
2. Facilitate the development of concepts of health and fitness through *instruction*, geared to the particular grade level, in applied physiology, principles of exercise and fitness, and body mechanics and movement fundamentals.
3. Teach carry-over recreation skills at the level of difficulty which the particular developmental level permits.

*This must be done, even if it means removing one physical education teacher from each high school! In this case, some re-training in terms of this rather "new" approach to physical education might be* necessary.

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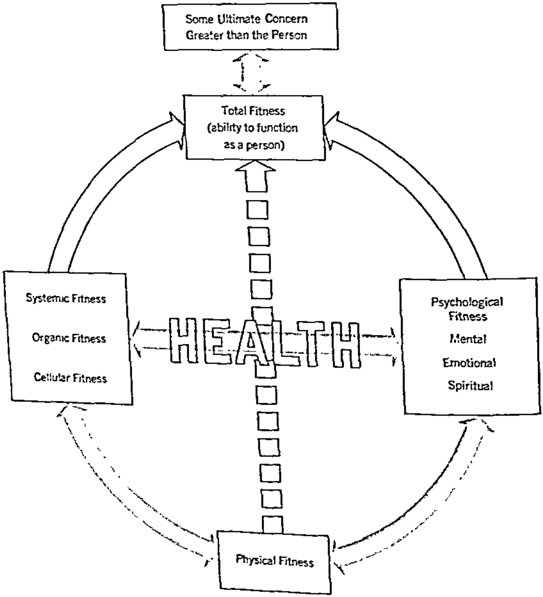
## SUMMARY: PHYSICAL FITNESS STATUS

The decision is really yours to make. What is our physical fitness status? What is a sensible approach to physical fitness? *The decisions on these two related questions might best be deferred until you have given some thought to the concepts presented in the next section, and even then, you should keep clearly in focus the concepts presented in the previous section. In other words, the answers to questions must be tempered with other decisions relating to "What is physical fitness?" and "How does it relate to health and to the individual's ultimate concern?" The answers to these questions about physical fitness have obvious implications for health education, physical education, and recreation programs.*


Some Ultimate Concern
Greater than the Person
Total Fitness
(ability to function
as a person)
Systemic Fitness
Organic Fitness
Cellular Fitness
HEALTH
Psychological
Fitness
Mental
Emotional
Spiritual
Physical Fitness

## THE RELATIONSHIP BETWEEN PHYSICAL FITNESS AND HEALTH

Does physical fitness really contribute to health? This is an often asked question and is indeed an important one that has implications for physical education, health education, and recreation. One might also ask, "Does physical education contribute to health?" Because there are as many kinds of physical education as there are physical educators, this could never be answered with any degree of certainty. At any rate, there is a larger and more important consideration: If physical fitness is related to health, is health in and of itself the ultimate end; that is to say, is health the ultimate purpose for which physical and health education and recreation exist? Our answer is simple and, to us, unequivocal: No, health is not an end in itself; it in turn contributes to what is often called something like *total fitness*, that is, *the ability to function effectively as a person.* To us, even this is not the end; total fitness must contribute to *some ultimate concern greater than the person.* We have presented the theoretical relationship between physical fitness and health as a part of this greater relationship in Figure 5.8.

It is simple enough to establish adequate grounds for the claim that physical fitness and health are related. Both logic and scientific evidence (see Chapters 8, 9, and 10) support such a position. Let us accept this position without delay and proceed to the more important concepts that can grow out of this position. Whenever a theoretical, schematic representation of an "idea" is presented, there are misunderstandings and invariably there are those who can find loopholes in the schematic. Some of the loopholes can be closed by eliminating misunderstandings, but we know that all of the holes cannot be thus repaired. We shall, however, at-

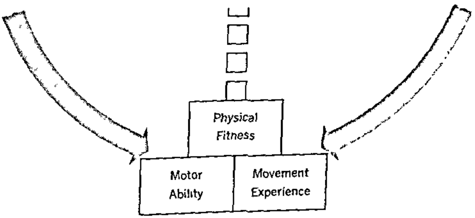



**FIGURE 5.9** An illustration of the relationships among physical fitness, motor ability, and movement experience as part of the total health picture.

tempt to eliminate as much misunderstanding as possible by presenting as clearly and concisely as we can the basic concepts related to this schematic illustration (Figure 5.8).

1. It is not claimed that all (or *any*) of the concepts represented are completely original. Perhaps the *totality* of the relationships, as represented, provides a different and more easily interpreted view.

2. Physical fitness and physical education, health education, and recreation are not the only factors contributing to health and total fitness. It is recognized that *many* other factors play a vital role in this relationship and thus contribute directly to "health" and/or "total fitness" (for example, religion, all forms of education, proper nutrition, and medicine).

3. The mid-third of the circle (which is blocked out and enclosed) is to us what is typically referred to as "health."

4. The upper third is perhaps the aspect of life that relates more closely to what is called philosophy or man's religion.

5 The lower third is *a* primary concern of physical education (note the emphasis on *a*; we did not say *the*).

a. Physical Fitness is one of three qualities that seem to us to be related aspects and responsibilities of physical education; the others (as shown in Figure 5.9) are movement experience and motor ability. We are talking about these as *qualities*, not the process of attaining these qualities, the qualities of *being* physically fit, of *having* movement experience, of *possessing* motor ability. These are interrelated but not uniformly so in all persons. One may have very little motor ability, very little and limited movement experience, but may be very physically fit. On the other hand, one may have a high level of motor ability, have had very narrow and limited movement experiences, and be very physically unfit. But each quality exerts an influence on the others, and, in physical education, it seems to us the aim is to do as much as we can for the qualities of physical fitness and movement experience within the limitations imposed by the individual's quality of motor ability. (Needless to say, such limitations, although very real, impose serious limitations upon the attainment of physical fitness and movement experience *only when and where there is an obsession with the importance of superior performance of sports skills.*)

b. Formal physical education, then, might be conceived as the process through which:

(1) The three qualities of physical fitness, movement experience, and motor ability are evaluated for the individual.

(2) Opportunity is provided for the individual to attain and/or improve any or all of these qualities.

(3) The concepts and methods for evaluating, attaining, and improving these qualities are taught.

(4) The concepts relating the lower third to the upper two thirds of

the circle are taught (that is, the concepts of physical fitness, movement experience, and motor ability, relating the qualities to health, total fitness, and an ultimate concern).

6. Formal health education is the process through which concepts relating the two basic qualities depicted (systemic fitness and psychological fitness) to each other and to all other aspects of life are developed.

7. Recreation provides *one* means through which the individual can attain the qualities included around the circle.

In summary, we suggest that there is little question that physical fitness and health are related but that this relationship becomes more meaningful only when (1) health is viewed as contributing to a greater end and (2) *physical fitness is viewed in proper perspective* in its relationship to total physical education and recreation. The theoretical relationship among physical fitness, health, total fitness, and man's ultimate concern, as we have schematically proposed it, in turn gives rise to a clear and workable concept of the relationship among physical education, health education, and recreation.

If physical fitness and health are related as we suggest, what does this mean? The relationship we have presented means, for one thing, that physical fitness is one quality that can contribute to man's living better, to his total fitness.

## DESCRIPTION OF THE THREE LEVELS OF TOTAL FITNESS

### Subminimal Total Fitness

If one's total fitness (TF) is subminimal, it may well be because he has expended little energy and time to attempt to reach his physical fitness potential. It is a state characterized by physical inefficiency and quite often by some degree of emotional instability as well. He is easily "fatigued," often "edgy," and unable to meet physical or emotional challenges head-on with confidence, determination, and a reasonable share of success.

### Minimal Total Fitness

When someone reaches the level of minimal TF he is characterized as a person who has the ability to respond physiologically and emotionally to typical daily patterns and problems in such a way as to maintain health and to carry out his function in society effectively. There is obviously a "gray" area here, and one will not always know and be able to evaluate objectively the criterion we have described for this level of TF. For example, there may be some hidden progressive degenerative change in health that is clinically silent for many years. Because of the limitations of current medical knowledge and diagnostic techniques, such a change may not be noticeable and thus may be beyond personal control until some symptom occurs. But one can take stock and determine whether he is respond-

ing to the challenge of life in such a way that he is not constantly "fatigued." He should know if he is happy and generally "relaxed" when he should be, and whether he has the capacity to enjoy life. On the other hand, if he is constantly "fatigued," often gloomy, prone to temper tantrums, unable to relax, and can see no ultimate purpose in life, it takes only a little self-analysis to become conscious of these conditions. If this is the case, then it is quite likely that he has *not* attained the minimal total fitness level. In such a case, one should be able to see that he is not capable of the total response to daily stimuli that is necessary for the maintenance of health. He could develop an ulcer or high blood pressure or any one of several psychosomatic disorders and may move slowly but steadily back toward the subminimal TF level. It is possible that TF *capacity* may even be reduced as a result of poor health.

One can readily see that this minimal level of total fitness is more than the traditional "physical" fitness, for it also includes spiritual and sociopsychological components. It is obvious that this type of fitness *is* an *individual* concern. Because people are engaged in such widely divergent kinds of work, and because any given situation may produce very different responses in different people, plans for the maintenance of fitness (broadly conceived) must be extremely flexible and highly individual. Whereas someone engaged in a physically demanding occupation may require a nonvigorous recreational activity, a more sedentary individual may well need activity that involves a relatively high energy expenditure. Some people may find fulfillment and emotional release in hobbies or sports. Others may find the satisfaction of these particular needs, as well as others, in their religious faith. In the event that the psychosociological equilibrium should become disrupted, there are a number of avenues available through which the informed individual can seek revitalization. Through knowledge of the body and an understanding of health and fitness, he can put the problem-solving and decision-making processes into action. His ultimate decision *can* be based on his intelligence and training; it may or may not involve vigorous exercise, relaxation techniques, a change of job, and so on. He must and can make an intelligent decision if he first admits the problem exists and then puts to work all of his own knowledge and training plus any necessary professional help. He can at least make a decision that enhances the probability that he will stop the downward fall on the TF scale and, in fact, remain at or move up to the minimal TF level; he may eventually even rise to the optimal level.

### Optimal Total Fitness

We progress now to what we consider to be the ideal or optimal TF level. At this level a person has the capacity to respond to near maximal, short-term effort or submaximal (but long-term) work without physiological or emotional debilitation. He is emotionally quite stable and has a tremendous capacity to "enjoy life." Such a person

is capable, because of a high *physical* fitness level, of carrying out a number of common tasks (even though he may be unaccustomed to them) without undue discomfort or injury. For example, it is doubtful whether the housewife and her businessman husband ever spend an entire eight-hour day moving heavy furniture or digging up shrubs and replanting them. Yet they may well want to (or have to!) do these things on a given Saturday. Some interesting and very appropriate questions immediately arise: Will they make it through the day? Will they be injured? Will they be so sore and stiff that they will hardly be able to move their aching and supersensitive masses of tissue from the bed next morning? Will this condition annoy them for several days and impair their work at the office and in the home? One must admit that chances are good that, for the typical American couple, at least, one (if not *all*) of these questions will be answered in the affirmative. People who speak from experience say that, for those eking out an effortless existence at a poor physical fitness and minimal total fitness level, the phenomena of sore and aching muscles and general irritation that result from unaccustomed work increase in severity and intensity with age.

How can one avoid such "weekend pathology"? Is there a magic panacea? You are probably thinking, "Aha, now they will tell me that exercise is *the* answer." It is obviously not that simple. The lack of adequate evidence precludes any definite, simple prescription. But we do know that in order to arrive at this optimal TF level, a person must expend *more* energy, and in *different* ways, if he is to avoid the more serious consequences of unaccustomed, occasional, near maximal work or play efforts. "Play" is included because the same symptoms (and probably more severe ones) commonly occur as a result of the weekend picnic softball game or the *annual* handball match. These consequences are not as likely to result from noncompetitive activity because one can stop whenever he wants to. At any rate, the best "prevention" appears to be some personally designed, *never-ceasing* plan for attaining physical fitness. This almost invariably means extra energy expenditure! There are two important suggestions for those who would like to attain an optimal physical fitness level: (1) "prevention" through slow and comfortable attainment of optimal physical fitness, in an ongoing, relatively simple maintenance program, is the safest and the most reliable prescription; (2) a high level of proficiency in games and skills is not only relatively unimportant but unnecessary—athletic ability is *not* a prerequisite to success in attaining optimal physical fitness (this has been discussed in greater detail on page 92).

In discussing the health base for total fitness, we should mention the need for knowledge on the part of the individual himself—it is not possible to make the best of the available medical knowledge without some *personal* understanding to supplement it. First, one must be familiar with the common communicable diseases, their symptoms and preventive programs (immunization) designed to eliminate them. Second, he

must understand and appreciate the current evidence with respect to the chronic degenerative diseases; furthermore, he should be able to interpret such evidence on the basis of some knowledge about the organs or systems involved. Third, he should be well informed about the availability and purposes of the public health agencies (see page 145). Fourth, he should be aware of the current community health problems, such as air pollution and water pollution, and their health implications (see page 145). Because the emphasis in this chapter is on concepts, these knowledges are discussed elsewhere. The diseases are discussed in appropriate chapters, depending upon the system(s) involved.

## THE RELATIONSHIP BETWEEN PHYSICAL FITNESS AND LONGEVITY

We have just addressed ourselves to "physical fitness and living better." Now we turn to the question "Does physical fitness contribute to a longer life?" or, to put it another way, "Does regular physical activity increase longevity?" Discussion of this question has provided a great deal more "heat" than "light." In short, there is no direct and unequivocal answer. Logic and some indirect statistical and experimental evidence lend support to the position that there is a positive relationship between physical fitness or regular physical activity and longevity. Logic would lead us to hypothesize that if physical fitness (which can only be attained via physical activity) is positively related to health, then it must be positively related to longevity because health is logically related to length of life (excluding accidental death and suicide). It is also logical that because psychological fitness is a positive aspect of health, living "better" should also have a positive effect on longevity.

Scientists have attempted to get at this question by studying the longevity of former college athletes as compared to the total population or to their former nonathlete classmates. Montoye (397) correctly points out the inappropriateness of the comparison with the total population. The other studies[1] in general find no significant longevity differences between former letter-winners and other college graduates; in other words, former college athletes, on the average, die no sooner, nor do they live longer, than their classmates. But the limitation in these studies is serious: what a man *did* or did *not* do with respect to college athletics has little to do with the amount of physical activity in his life after college. Furthermore, stress, diet, and genetic factors are not usually accounted for.

There is, on the other hand, considerable indirect evidence, especially that which deals with occupation and ischemic heart disease, which supports the position that regular physical activity promotes longevity. It might be helpful to refer to the material on pages 196 through 200 in this connection.

[1]Dr. Henry Montoye and his coworkers have published two excellent reviews of the sports participation-longevity studies (395, 397).

Hammond's (226) study reveals startling and dramatic longevity differences between no-exercise and heavy-exercise subjects as well as the two degrees of activity in between. For example, reading from Figure 5.10 we see that even in the 45–49 age group, there were 4.6 times as many deaths in the no-exercise group. As Hammond is careful to point out, "ill health may reduce the ability or the desire to exercise." This could account for some of the differences in this study, but it appears to be another fragment of evidence which supports regular exercise as a valuable adjustment to good health.

## PHYSICAL FITNESS AND RESISTANCE TO INFECTION

*Physical fitness enthusiasts have been known to claim somewhat positively that fitness will prevent everything from the common cold to cancer!*

There is no evidence to support this contention. In fact, in her excellent review, Baetjer (29) presents evidence that, in animals innoculated with bacteria, infection is more likely to occur if exercise-induced fatigue follows the innoculation; fatigue occurring before innoculation also increases the likelihood of infection. Steinhaus, in sum-

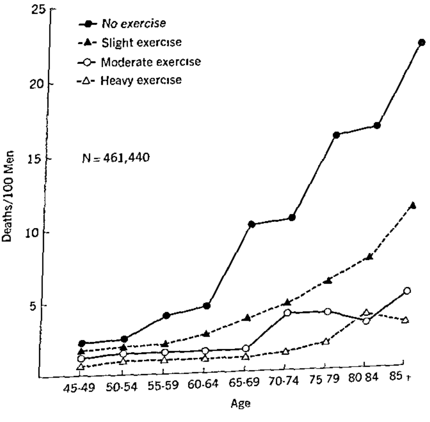



**FIGURE 5.10** Death rate by degree of exercise and age group during a period of approximately one year after first survey. For example, in the age group 60–64, 1 percent (1/100) of the men in the heavy exercise category died, whereas 5 percent of those in the no-exercise group died during the follow-up year. Adapted from Hammond (226).

marizing experimentation in this area, says, "It is fair to conclude that physical training probably does not augment the body's specific disease fighting agencies" (543, p 128). Logic indicates that, in line with the fatigue-bacteria evidence, the ability to postpone fatigue which usually results from regular training may indirectly reduce chances for infection.

Merrill and Howe (387) in 1928 presented evidence that supports Baetjer's work but also reported that training greatly increased the resistance of rats even when severe exercise-induced fatigue followed the infection.

## HEALTH APPRAISAL

The various tests of physical fitness are described in Chapters 8 and 9. With respect to health appraisal it seems logical to classify health examinations according to these arbitrary boundaries:

- Routine (regular checkups)
  - Physical (becoming more common)
  - Mental (not yet accepted as necessary)
- Suspect (when disease or disorder becomes apparent)
  - Physical (common)
  - Mental (less common than physical, but becoming more so)

It is the health educator's job to educate people with respect to the importance of both the routine and the suspect health examinations and the responsibility of the physical educator (and under certain circumstances, the recreation worker) to require a routine physical examination prior to participation in vigorous activity programs. All these people should be expected to make referrals when a suspect examination appears to be necessary.

## ROUTINE EXAMINATIONS

In order to establish his health status, one should regularly visit his physician for a health examination. Once a year is recommended for adults, but this will vary for some individuals (see Table 5.5). One should expect and demand certain tests. An excellent discussion, written in lay terms, is reproduced here to familiarize you with the criteria for a thorough physical examination.

**TABLE 5.5** Recommended Frequency for Physical Examinations

| AGE (YEARS) | FREQUENCY FOR NORMAL PEOPLE, NO CHRONIC ILLNESS |
|---|---|
| 0–1 | Every six weeks |
| 1–2 | Every three months |
| 2–6 | Twice yearly |
| 6–45 | Yearly |
| 45+ | Some recommended once every nine months |

SOURCE: Adapted from *Consumer Reports*, 21.31, 1956

### Just What Is a Complete Physical?

It's a physical examination that doctors say you should undergo regularly, the frequency depending on your age and general health. The completeness of a "complete" medical checkup often varies with what the doctor already knows or suspects about you. In most cases, such a checkup is merely rou-

tine, takes probably no more than an hour, and is performed in the doctor's office. A typical examination might be something like the following, although, depending on the circumstances, your own doctor may do less or more.

HISTORY If he hasn't already, the doctor will take your complete personal-health history. This is generally considered the most important part of the examination. It supplies the doctor with specific things to watch for during the checkup.

For instance, there are questions on how well you eat and sleep and about any symptomatic aches and pains. You are asked to describe the exact nature of your job, in case there are occupational hazards that could cause physical or emotional illness. The medical history (past illnesses and causes of death of relatives) of you and your family is noted. And questions about how you get along with your family, friends, and co-workers, whether you worry, and whether you like your job may be asked as leads to any psychological problems.

OBSERVATION The doctor examines you primarily through observation, feel, and use of instruments such as the stethoscope, his listening device. He makes you sit, lie, and stand in various positions according to what he may be looking for. Much of the checkup is by simple observation, and you may not realize that you're being examined. For example, the doctor takes note of the color and quality of skin, the luster and dryness of hair, the condition of nails, and so on. If abnormal, these things may be significant clues to specific ailments. He checks for scars, rashes, scabs, skin tumors, moles, swellings, discolorations, or similar visible conditions, which occasionally indicate the possibility of a serious disease. He notes your general posture, especially looking for any abnormal curvature of the spine.

MEASUREMENTS He records temperature, pulse, and weight and, when possible, compares them with those noted in any previous examination. If the doctor suspects any heart disease (or even if he doesn't), he may have you do some simple exercise to find out how quickly your pulse rate returns to normal. It should do so in about a minute; if it doesn't, the doctor then has at least an indication of your tolerance for exercise.

EYES, EARS, ETC. The doctor works from head to feet, first checking your scalp, eyes, ears, mouth, teeth, throat, and nasal passages for infections, inflammations, and growths. He or his office assistant records your blood pressure. He gives vision and hearing tests in various ways—for example, he uses a lenslike instrument to look for eye defects. Hardening of the arteries, hypertension, and kidney trouble are sometimes indicated by changes in blood vessels within the eyes.

LYMPH GLANDS When a doctor touches you in the neck, armpits, and crooks of the arms, he is determining that lymph glands at those points are normal. Glands such as these generally cannot be felt. If the doctor does feel them, the swelling tells him there may be infection or malignancies somewhere else in the body. Enlargement of the thyroid gland (in the neck, in front) may indicate abnormalities of function that could be serious.

CHEST, LUNGS These are examined by touch, by tapping, and with a stethoscope. Inhaling deeply and then exhaling shows the amount of chest expansion—useful in checking for lung ailments, notably asthma, where the chest wall is fixed and there is little, if any, expansion. The doctor listens for normal breathing signs. For example, abnormal sounds can indicate such things as pneumonia, collapsed lungs, heart dis-

ease, and pleurisy. Women's breasts are examined for any lumps which could be indications of cancer.

HEART Examining your heart, the doctor listens (with the stethoscope) for variations from normal sounds and rhythms. Slight variations may merely mean that you smoke too much, drink too much coffee, etc. But they may mean more serious trouble, and the doctor may then use more thorough heart tests.

ABDOMEN The doctor tests for hernia by having you cough as he looks for reactions —in the abdominal wall or the groin for men or in the thighs for women. He may have you lie on your back as he presses and feels various parts of your abdomen. He is probing, among other things, for the kidneys, liver, and spleen. If any appear to be too enlarged, the doctor may order further tests. For instance, if he feels the edge of your liver and it's hard or knotty, he checks for possible cancer or cirrhosis (a condition that usually causes a deterioration of liver function) While poking and feeling, the doctor watches for any lumps or masses that may be tumors.

Lymph glands in the groin are examined for enlargement that might indicate infections elsewhere in the body. Thighs and legs are checked for varicose (swollen and knotted) veins, and feet are inspected for swelling or signs of strain, caused possibly by overweight. Reflexes, such as the knee jerk, are also tested for signs of possible brain or spinal-cord damage.

RECTUM, PELVIS A rectal examination is to detect any tumors which can be early signs of cancer. Women undergo a pelvic examination (which includes the uterus and ovaries) also primarily to detect cancer.

LABORATORY TESTS Those given depend on what the rest of the examination turns up. Assuming nothing out of the ordinary is suspected, they usually include only a urinalysis, a chest X ray for tuberculosis, and various blood tests.

Usually, after the age of forty, vaginal smears (to detect cancer early) are part of all routine checkups for women, and an electrocardiogram becomes a regular test for men. An electrocardiogram—which registers heart activity by tracing a curve on graphlike paper—is also given women in many routine checkups after the menopause. Another routine test for men and women over forty is a sigmoidoscopy. This involves examination of the rectum and colon for cancer through the use of a special instrument.

Laboratory tests occasionally turn up something the doctor has not spotted in other phases of his checkup. And the tests often serve as confirmation for the doctor's preliminary diagnosis.[2]

As a person ages, he should request additional tests if they are not automatically included by the physician. We highly recommend, in addition to the routine procedures, that an exercise ECG should become a part of the physical examination after age 35. There is evidence that such a test, in the hands of the skilled physician, can be a valuable diagnostic and predictive tool in the case of otherwise silent heart disease (73, 369).

A routine but thorough health examination will establish, to the best of

[2]The foregoing discussion of a physical examination is reprinted by permission from the August, 1960, issue of *Good Housekeeping Magazine*. © 1960 by The Hearst Corporation.

medical science's knowledge, one's systemic health base, at least from the physical standpoint.

## SUMMARY

Health is "mental and physical well-being," and physical fitness is "the capacity to carry out physical tasks involving considerable muscular effort and, thus, requiring well conditioned neuromuscular and circulo-respiratory systems."

We have proposed a distinction between physical fitness and motor ability in keeping with the above definitions wherein only the qualities related to good health and to total fitness are classified as physical fitness components (strength, flexibility, muscular endurance, and circulo-respiratory capacity). These are qualities that nearly all normal persons can improve with some effort.

Although there may be some disagreement as to exactly how our nation's health status and physical fitness status should be rated, there is little argument that improvement in both is desirable.

Health (systemic and psychological fitness) and physical fitness are most assuredly related but both contribute to a more important fitness—total fitness (the ability to function as a person) and, hopefully, to a still more important end—man's service to some ultimate concern greater than himself. We have defined and interrelated the roles of the health educator, physical educator, and recreation specialist in keeping with these relationships.

Although there is logic and some strong indirect evidence in support of the contention that physical fitness (regular physical exercise) increases longevity, there is as yet no direct, irrefutable evidence to support such a statement. There is little support for the claim that regular exercise will prevent viral and bacterial infections.

The three levels of total fitness (ability to function as an individual) are characterized as follows:

1. Subminimal—physically inefficient and inadequate; unable to meet emotional challenges successfully.
2. Minimal—physically and emotionally capable of meeting the demands of the normal day.
3. Optimal—physically and emotionally capable of meeting the demands imposed by extreme physical work loads and/or mental tasks (see principle 5 below).

## PRINCIPLES

1. Optimal levels of health and physical fitness are not ends in themselves. They are, however, prerequisites to the achievement of one's fullest human potential.
2. Health and physical fitness are separate and distinct characteristics, but each can serve to place limitations on the other.
3. *Any* reasonably healthy person can achieve vast improvement in his physical fitness status.
4. Exceptional motor ability is *not* a prerequisite for the attainment of high levels of physical fitness.

5. Minimal, optimal, and maximal levels of physical fitness can be defined only in terms of a given individual and his unique requirements—*not* in terms of a group or a population.

6. Physical fitness is not a single factor or quality of being; it is made up of several components, each of which requires specific means of improvement.

7. The attainment of optimal levels of physical fitness is directly dependent upon a progressive expenditure of energy over an extended period of time in a variety of appropriate activities.

8. There appears to be a widespread willingness among people of almost all cultures to accept and perpetuate *misinformation* pertaining to health related behavior.

9. In order to effect desirable changes in matters of health or fitness, the educator must become aware of the following:

a. The perceptions, attitudes, and knowledge of the population with which he is dealing;

b. The sources from which people have obtained the information on which their perceptions and attitudes are based;

c. The basic physiological, psychological, and social phenomena underlying human function and behavior;

d. The principles of effective interpersonal communication.

10. Despite the efforts of the medical professions it is impossible for medical knowledge to be fully effective in the lives of individuals unless they have some understanding of the basic health-related problems of modern living.

11. Because many serious diseases do not produce obvious symptoms in their early stages, routine medical checkups are essential for the early detection of many serious health problems.

12. For the protection of the participant (and the supervising individual or agency, as well), medical examinations must be obtained before participation in vigorous sports or exercise programs.

## EXPERIMENTS AND EXPERIENCES

1. Survey current magazines for articles concerned with fitness. Analyze each article for expressed or implied definitions of physical fitness. Compare these definitions with the concepts outlined in this chapter.

a. How many articles include motor ability items in discussions or descriptions of fitness?

b. How many articles describe exercises such as push-ups or pull-ups as being designed for strength development?

c. How many articles include flexibility as a fitness element?

d. How many of the articles include body fatness as part of physical fitness?

e. How many of the articles appear to equate sports programs with fitness programs?

f. How many of the articles appear to equate fitness programs with calisthenics; with weight lifting; with running?

2. Contact a sample of people including representatives (both male and female)

# The Concept of Health and Fitness Education

## Chapter 6

### INDOCTRINATION OR EDUCATION?

For your students to answer the question "Are you well informed or 'educated' on matters of health and physical fitness?" with the response "I have taken courses in health and physical education" is no more justifiable than for you to claim that you have a sound general education simply because you have a high school diploma. The term *educated*, when applied to a particular discipline, implies a reasonable degree of *mastery* of the content of the field. It means that a person has sufficient knowledge and understanding of the field to identify its problems and propose reasonable solutions, that he is able to discuss intelligently ideas and concepts germane to the field. This ability does not come from exposure to isolated facts or from limited contact with situations that are not intellectually challenging to the individual.

For example, a girl who has had a bout with pneumonia will have acquired certain information about the disease, but it is doubtful whether anyone would be likely to assume that she really knows much about pneumonia. No doubt she has


Figure 6.1

developed certain attitudes as a result of her experience, but what has she really learned about her illness?

On the other hand, the physician who treated her would be expected to have considerable knowledge concerning pneumonia. He was armed with more than simple firsthand experience with the disease, however. His professional training provided him with the necessary understanding of the cause and usual course of the illness, as well as a knowledge of appropriate methods of treatment, enabling him to see the girl safely through her unpleasant ordeal.

It is evident that mere exposure to selected situations can provide an individual with experiences that may result in the formation of certain *attitudes*. This, however, does not enable him to take successful steps for the preservation of his own well-being through purposeful changes in behavior and intelligent manipulation of his environment. Ability to do so comes only after he has also developed a substantial *understanding* of (1) the nature of the human organism and (2) how it is affected by various behavioral and environmental alternatives.

Each of us has his own personal interests, goals, and aspirations as well as differing likes and dislikes, unique talents, and limitations. It is therefore absurd to think that any one person or

group of persons can design a health and fitness program that will meet *all* the needs of *every* individual. Furthermore, if such a procedure were possible, it would not be classified as education. Unfortunately, many of the traditional programs in the areas of health and physical education have bordered on indoctrination and regimentation instead of providing the individual with factual information that will give him a basis for determining an intelligent course of action.

At the high school and college levels it seems particularly important to emphasize that *each person must take the responsibility for what he does with his own life*. If, however, such a goal is to be successfully realized, the colleges and high schools must provide each individual with an *education* in the true sense of the word. From the standpoint of physical education and health education this means that every person must be acquainted with pertinent information relating to health and personal well-being as it is affected by exercise, social practices, occupation, personal habits, and diet. In addition, the methods whereby personal health and fitness can be achieved and maintained must be presented and scientifically evaluated. Provision for the development of a personally satisfying level of skill in one or more of these physical activities is a responsibility of high schools and colleges if these institutions subscribe to the belief that the attainment of a reasonable level of skill is a factor of consequence in the decisions that students make about their activity regimens.

Finally, as in all phases of education, presentation of information must be as complete and as unbiased as possible. Fact must be clearly distinguished from opinion. Such an undertaking, although enriching and rewarding, is never easy. Teachers find the task of collecting and organizing great masses of data time consuming and tedious. The student, in meeting his responsibilities, similarly discovers that indoctrination is a much simpler process than education! The learning of basic facts and evaluating and examining the relationships between them are processes that are conveniently circumvented in many programs where indoctrination rather than education is the ultimate goal.

So it is in answering the question "Are your students well informed or 'educated' on matters of health and physical fitness?" that the answers to three subordinate questions are important:

1. Do they have a comprehensive understanding of the physiological and psychological effects of physical activity and other health-related behavior?
2. Do they possess sufficient information to enable them to decide what kinds of behavior are best for them as individuals?
3. Have they a knowledge of a sufficiently wide variety of activities and techniques so that they could select and practice behaviors suitable to their interests, needs, and abilities?

The individual who can intelligently answer these questions is well on his way to being educated in matters of health and fitness.

## SELF-ANALYSIS

"Know thyself" is a phrase that is familiar to all of us. It is stressed as a goal particularly in the disciplines of philosophy and psychology. From a practical standpoint, it is essential that we all learn to evaluate realistically our talents as well as our limitations. It is important for our own welfare that we neither grossly underestimate nor overestimate our own capacities and capabilities!

In order to do this adequately, however, we need some means of getting information about ourselves. Psychology provides intelligence tests and aptitude tests for our guidance. A simple mirror or perhaps some candid photographs frequently tell us how we look to others. A visit to the physician's office helps us to get a good idea of our status with respect to disease and physical degeneration.

There is, however, the need for a little more information about ourselves if we are going to be able to do an adequate job of problem solving and decision making in terms of our personal health and fitness.

It seems to be characteristic of people to harbor certain unrealistic ideas about their own capacities and even their physical appearance. For some reason a man in his forties may stoutly maintain, "I'm as good a man as I ever was!" and frequently, with disastrous results, he attempts to demonstrate his point. Women who steadfastly refuse to acknowledge their requirement for a larger size in a dress or a shoe are by no means unusual.

It is quite obvious to the intelligent individual that simply denying the existence of an undesirable situation affecting a person is not an effective way of correcting it. If real progress is to be made, it seems only sensible to analyze the prevailing situation as objectively as possible. This, of course, implies securing an accurate appraisal of one's condition at the time. As soon as such an appraisal is obtained, the necessary steps to improve the situation can be undertaken with relative ease.

For this reason when one is given the opportunity to participate in a series of tests that will provide him with a realistic profile of himself, he should take advantage of it, for he will be in a position to correct or adapt to his physical inadequacies and to maintain his present assets effectively.

If it has not already occurred to you to ask a leading question or two about *why* this whole approach to health and fitness is necessary, it probably will soon. This is a question that should be asked and one that deserves a satisfactory answer.

It is probably true that many high school and college students, particularly men, do not have to be convinced of the desirability of participating in sports, games, and other forms of strenuous physical activity. They participate because they are young and vigorous and because they *enjoy* the challenge and the excitement involved. Some forms of physical activity contribute to social standing and are, to some people, highly desirable for that reason alone. In any case, such people do not

have to be urged and cajoled into participating in physical activity.

It may also be true, however, that as the pressures of responsibility mount, the level of participation, which is motivated by the desire for pleasure and social standing, tends to diminish. "I just don't have the time," is a typical complaint, and as the individual grows older and his responsibilities increase and pressures multiply, such participation drops proportionately. The active team games in which one learns to compete and pit his own prowess against that of others are no longer a practical or appropriate vehicle for the expression of such urges. The logical alternative is to turn to less strenuous, more convenient activities that retain the element of skill, challenge, and competition, such as bridge and bowling.

If the social and psychological fulfillment that can be gained from such activities is all that is being sought by the individual, then his switch from the active to the inactive pastimes must be considered a wise move. This implies, however, a fundamental lack of knowledge concerning the total picture. One major consideration—that of the physiological effects—has obviously been overlooked. As will be discussed later, there is a great deal of evidence to indicate that physical inactivity, coupled with our stressful pattern of living, has much to do with our present high incidence of degenerative disease affecting virtually all the systems of the body.

In the past, most programs of physical education have stressed the need for people to remain physically active throughout life. It has been reasoned that if a person is proficient in a skill and enjoys it he will continue his activity. For certain sports this logic holds, but many of the skills in which young people become interested and proficient are the team games and other sports that may be impossible for them to engage in after leaving school. Theoretically, the problem could be resolved by providing instruction in the so-called carry-over sports, such as swimming, tennis, badminton, skiing, archery, golf, and others.

In practical terms an individual sports program is difficult to institute under present conditions because of the lack of proper facilities and equipment in most schools. It is possible, however, and is being accomplished in some communities. In such cases the question now becomes, "Does this step alone ensure continued participation of the individual on a regular basis?" Unfortunately, the answer appears to be in the negative.

We believe that one of the reasons for this failure is that the matter of people's *knowledge* or lack of knowledge concerning the physiological consequences of physical inactivity is almost entirely ignored in traditional health and physical education programs. People who gain tremendous satisfaction from sports competition may, as they grow older, discover other equally satisfying outlets for their competitive urges in less strenuous pursuits. Those who have gained social recognition and approval through athletics are able to move on to other less vigorous activities in which they

can continue to experience the same sort of psychological benefits. Although these people may never lose their love for sports and games, they find that this need can be at least partially met through watching others compete.

At this point we could well sketch a picture of a successful college athlete who takes on the responsibility of a job and a family. Because of pressures, changing social patterns, and other circumstances he finds that he transfers his love for competition in basketball or football to bowling or perhaps even to his business. He still enjoys attending sporting events or watching them on television and he may even become active in some sort of organization that sponsors boys' leagues of one kind or another. In short, he has been able to satisfy many of the needs formerly met by sports activity by means other than that of active participation—all his needs, in fact, except one kind: the biological.

The irony of this situation is that he is unaware of any deficiency. If he is typical, he thinks that he is getting adequate exercise through his bowling and through coaching a little league team. His lack of knowledge and understanding of how to assess and adequately meet his own health needs may well have robbed him of benefits that he might easily and enjoyably have derived from suitable exercise.

If the former athlete may find himself divorced from physically active pursuits, what can be expected for the average nonathlete? In this category we may have people with all sorts of attitudes toward physical activity, ranging from moderately frustrated fascination to complete disinterest and dislike. Such individuals would certainly be no better off than the athlete, if not considerably worse. Whereas the former athlete may be ignoring certain physiological needs, the nonparticipant may well have unmet social or psychological needs superimposed upon these as well. This is not to presume, however, that vigorous physical activity *is* a panacea for all of man's ills. It is merely an affirmation of the position that regular exercise is *one* of the important requirements for long-term well-being in the times in which we live.

This book places the emphasis on the personal program approach to health and to exercise. In direct contrast to some systems of physical education, it recognizes that although all people need and can profit from exercise, everyone does not want or need the *same kinds* of activities. Some people are "games players." They love competition and are adept at skills involving throwing and catching. Other people derive great satisfaction from pitting their strength and stamina against another human being. Still others prefer to engage in activities in which the only standard is their own previous performance. And, finally, there are those who, for one reason or another, do not enjoy *any* activity that remotely resembles exercise. All these groups, however, regardless of their own particular likes and dislikes, have one thing in common: a biological need for regular, vigorous, physical activity. (Documentation of this point of view

will appear in subsequent chapters.) It also points out the need for "active" and dynamic learning experiences in health education. The time-honored "textbook, poster, and movies" approach is archaic and is not likely to promote learning.

How then can any program possibly hope to cope successfully with diversity of interests? The obvious answer, we believe, is to provide all these individuals with the facts about health and the interrelationships with physical activity, acquaint them with a wide variety of basic techniques that can be used to attain adequate levels of physical fitness; next assist them in acquiring experience and reasonable proficiency in some practical or individual activity, and then encourage them to make their own decisions about the importance of good health and physical activity in their lives. Under such a plan, those who elect to supplement their occupational duties with some type of regular exercise program will be able to select —or design—the type of activity that appeals to them and that will, at the same time, meet their personal physiological, social, and psychological needs.

## PROMOTING HEALTH AND FITNESS

Any plans to attack the fortress of "Mr. and Mrs. Modern," unaware and sedentary, must take into account the fact that they are surrounded by a moat of *misunderstanding* and, possibly even more resistant to attack, a wall of *indif-*

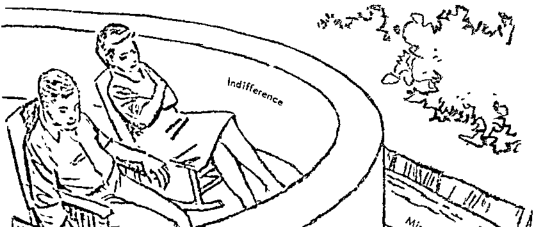



FIGURE 6.2 Mr and Mrs Modern Sedentary U.S.A.

*ference.* Misunderstanding and indifference will be difficult to penetrate in the adult population—perhaps even difficult to push aside in the present school-age youngsters and college students. Community leaders and parents should be aware of the problems, needs, and possible solutions. The following suggested approaches are advanced in full knowledge that, although each is important, probably the critical and most hopeful approaches involve the *preschool program and a new and revitalized program of integrated* health and physical education in the schools.

## FOR THE ADULT, NONSCHOOL POPULATION

The best hope for the adult population is that, through the popular communication media and through contact with children in the program recommended below, they will become aware of and interested in moving up the health and fitness ladder. Specifically, we recommend that leaders in health, physical education, and recreation recommend and *publicize* personal programs based on the suggestions outlined on page 624.

## FOR SCHOOL-AGE CHILDREN AND YOUTH

*It is our firm belief that the most promising, long-range solution to this total problem lies in an integrated school health and physical education problem for grades K to 12. It is the purpose of this kind of program, some form of which is practiced at a few colleges and high schools, to supplement the*

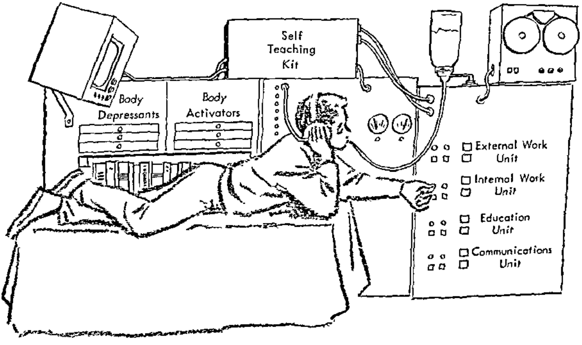



**FIGURE 6.3** *Physical and mental takeiteasyism.*

traditional skills approach with opportunities to experience and evaluate objectively the need for and the values of being healthy and fit. These opportunities come through *personal* experiences in life—meeting *personal* needs based on capacities. In addition—and these are the missing ingredients in traditional health and physical education curricula—our schools must teach the research-substantiated benefits *and limitations* of health practices and exercise and fitness programs; and they must emphasize the importance of a body of scientific knowledge for making intelligent decisions relative to exercise, health, and fitness. In such a program students can truly become "health- and fitness-educated." This book is dedicated to supplying these two missing ingredients.

It is our contention that misconceptions, frustrations, and fears often result from health education and physical education programs limited to memorization, skills instruction, and participation in games. We often forget that memorization of health principles is boring, that some youngsters do *not* enjoy sports, especially when skill level is poor and there is little or no success. Indifference often results over a period of years from the misconception that skills, health, and fitness are all one and the same. This indifference and frustration can best be prevented by a well-planned, early, and dynamic exposure to a sound personal health and fitness program. There is evidence that early learning is superior to late learning (see page 119 Does it not seem logical that health and fitness education should capitalize on this "law of nature"? It is possible that the much-discussed lack of creativity and vitality in our people can be at least partially minimized through such an effective and creative approach to health and fitness. *Making decisions relative to health and fitness certainly involves creativity and, hopefully, will also lead to improved "vitality" and fitness.*

## FOR PRESCHOOL CHILDREN

The importance of early training in the home has obvious application to the development of the total health and fitness concept. If health and fitness, including all controllable factors, is established firmly as a "way of life" in the home, we will have the best start possible in the push to develop some semblance of a respectable health and fitness level in our population. If a baby sees from his crib a vigorous way of life going on about him, will he not be likely to *join* in that way of life on his own level at his own time and accept this as his way of life? Steinhaus (543, p. 28) may have been very close to the truth of the matter when he maintained that mothers are our first physical education teachers! (A recent study 482) presents evidence that high school students who are active are given significantly better examples to follow concerning physical activity than are inactive students. Their fathers are physically more active and their parents give them more encouragement to participate in vigorous activities than is true of inactive students.) The quality of the early parental "instruction" and

the example of planned, regular, and vigorous activity by mother and father may well be the key that opens the door to a creative and healthful life.

## COMMUNITY HEALTH AGENCIES

It is imperative that health educators, physical educators, and recreation leaders have some knowledge about typical community health services and some of the specific health organizations available for assistance of various kinds. A listing of these services and health agencies is outlined.

A. General functions: Each state has a health department (a city or a county may also have a health department). *The services usually include:*

1. Recording births, deaths, sickness
2. Sanitation (water, milk, food, air, inspection of swimming pools, garbage and sewage disposal, inspection of restaurants)
3. Laboratories for supervision of sanitation and for communicable disease control
4. Control and prevention of communicable disease
5. Public health education
6. Hygiene during maternity, infancy, and childhood for those who cannot afford proper care
7. *Occasionally:* crippled children's services, dental health, mental health clinics, school health screening programs

B. *Some specific* health organizations (national, state, community, and voluntary), which *provide* some patient

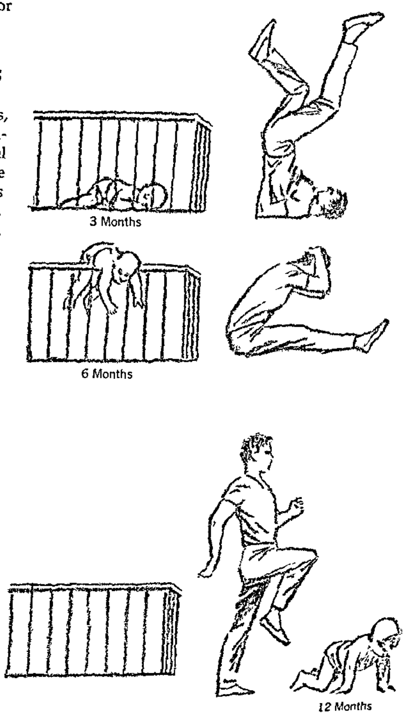



**FIGURE 6.4** A "way of life"

services, are listed. Offices are not necessarily located in every area, but one can determine what services are available by checking with the city, county, or state health department.

1. U.S. Public Health Service
2. Local or State Health Department
3. Community Chest
4. U.S. Veterans' Administration
5. Council of Social Agencies
6. State Board for Crippled Children
7. State Commission for the Blind
8. American Cancer Society
9. The American Red Cross
10. The American Hearing Society
11. The American Heart Association
12. The National Multiple Sclerosis Society
13. The National Foundation for Neuromuscular Diseases, Inc.
14. National Society for the Aid of Retarded Children
15. National Tuberculosis Association
16. The National Society for Crippled Children and Adults
17. United Cerebral Palsy Associations

## SUMMARY

Neither mere exposure to facts and experiences nor indoctrination techniques lead to true education.

Each person must be helped to realize that he must take responsibility for what he does with his own life.

The health- and fitness-educated person: (1) understands the physiological and psychological effects of physical activity and inactivity; (2) knows how to decide how much and what kind of activity is best for him; (3) can select skills or techniques suitable to his interests, needs, and abilities.

The personalized approach to health and fitness holds the most promise for promoting sound health and fitness education at all levels of instruction.

The public's misunderstanding of and indifference toward the real nature of health and fitness must be overcome by an intelligent and dynamic approach to teaching about health and fitness.

Misconceptions, frustrations, and fears often result for health and physical education programs based on memorization and over-emphasis on games participation.

## PRINCIPLES

1. In order for people to be in a position to take successful steps for preservation of their own well-being, they must have an understanding of the nature of the human organism and how it is affected by behavioral and environmental factors.

2. The best way to reduce the misconceptions and frustrations associated with health and fitness concepts is to *prevent* such unfortunate blemishes through purposeful *education* provided early enough in the child's life to capitalize on the principle of early learning.

## EXPERIMENTS AND EXPERIENCES

1. Systematically survey your own classmates. How many claim to have

had a good "health" education? A good "physical" education? What do they mean by good? When did such programs begin? Have they known persons who had misconceptions and ungrounded frustrations about health and fitness? What seemed to have caused these attitudes or feelings?

2. Identify recent examples of health and/or fitness education for the adult population. Evaluate them in terms of accuracy and effectiveness. What improvements could you suggest?

3. Did you graduate from high school well educated in matters of health and fitness? Why so or why not?

4. Select some health and fitness concepts which you feel are essential and also realistically attainable for a given age child. Talk with some children in that age group to determine: (1) do they have the concept in hand? (2) if not, can they assimilate it with your help? Discuss your results with your contemporaries. Try the same survey on the same concepts with high school youth, college students, young adults, and older adults. What meaning do you attach to your results and how do they relate to the concepts and two key principles of this chapter?

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# PART III

# Philosophic and Scientific Foundations

# Basic Philosophic Considerations

by Jan Broekhoff[1]

## Chapter 7

*What is mind?/No matter!*
*What is matter?/Never mind!* (100, p. 51)

Earlier in this book you may have come across the word *philosophy* and read about the desirability of developing a philosophy of life. We must now ask ourselves the question of what philosophy is and what possible significance it has for physical education. Perhaps no word in the English language has lost so much of its original significance in its daily usage as the word philosophy. Nowadays, when a person refers to his "philosophy" with respect to certain problems, he usually does not pretend to offer more than a personal opinion. But it is precisely personal opinion that is furthest removed from true philosophy.

In the famous "Allegory of the Cave," the great philosopher Plato compares men of opinion with prisoners in an underground den who mistake shadows cast on a wall for realities because they have been chained in the dark from childhood. The only way for the prisoners to gain real knowledge would

[1]This chapter was written especially for this book by Dr. Jan Broekhoff of the University of Toledo. Dr. Broekhoff is a specialist in the philosophical and historical aspects of physical education.

be to break their chains and turn to the light at the risk of being blinded by its intensity (456, p. 773). Plato alludes of course to the fact that most of us are prisoners in a world of bias, partly of our own making. By this allegory he also shows a deep distrust for the world of the senses, a position not universally shared by philosophers after him. Regardless of this, however, the philosopher emerges as the man of knowledge distinguished from the man of opinion. *Philosophy*, as the word itself indicates (*philein*—" to love," and *sophos*—" wisdom"), is the search for wisdom.

At this point you may ask yourself what distinguishes the philosopher from the scientist, because the latter, too, has a stake in knowledge. And science was indeed in its early stages of development nothing but an offshoot of an all-encompassing philosophy. Science gained its independence, however, primarily through the type of questions scientists posed and through the method by which they sought to answer these questions. In studying and observing the physical world, the scientist formulates problems that ultimately must be answered and verified by empirical evidence. One of the most important scientific tools is the controlled experiment in which only selected aspects of reality are allowed to vary. In contrast, few if any answers to philosophical questions can be subjected to empirical verification and experimentation. The meaning of this difference between science and philosophy will become clearer to you when we discuss specific issues later in this chapter. For the moment it is important to realize that, as a rule, science cannot provide answers to philosophical questions.

In several periods of its history, notably during the Middle Ages, philosophy had a close connection with religion. Even today, many speculative philosophical inquiries into the nature of man and the universe border on questions asked in religion. Whereas the answers to such questions in philosophy are reached through the power of human reason, they are guided in religion by faith. Part of the philosophic enterprise has been and still is to determine the rules of reasoning in what is called the study of logic. In the search for knowledge, logical analysis has always been the hallmark of the philosophical method, but this is not to say that philosophers have always closed their minds to knowledge of a more intuitive order.

Although the history of philosophical thought shows a wide variety of concerns, certain themes have recurred with great consistency. The eighteenth-century German philosopher Immanuel Kant summarized the main speculative and practical philosophical problems in the following three questions: (1) What can I know? (2) What ought I to do? and (3) What may I hope? For Kant these three questions were focused and synthesized in the one basic problem: What is man? (117, p. 315) In a more formal way, but very much related to Kant's fundamental questions, one can distinguish several branches of philosophy according to the emphasis on particular problems. Thus, the study of knowledge is called *epistemology*, the

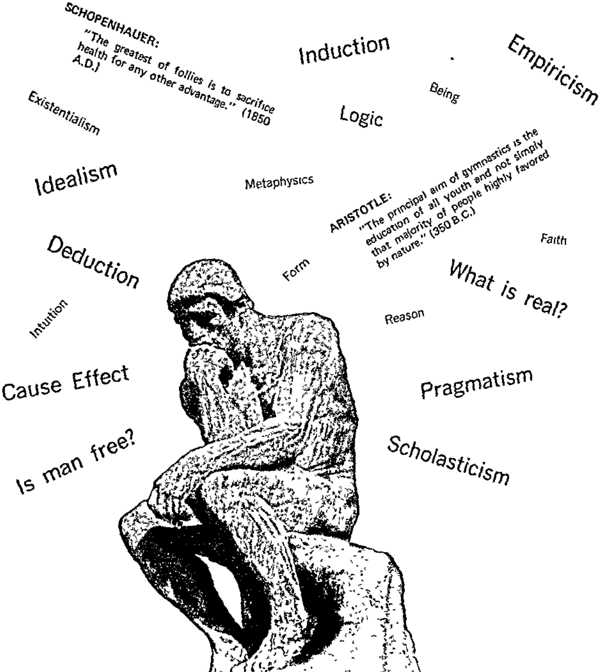


**FIGURE 7.1** *The philosopher attempts to reach the answers to questions concerning the nature of man and the universe through the power of human reason. (Auguste Rodin, "The Thinker," Rodin Museum, Philadelphia. Courtesy Philadelphia Museum of Art.)*

study of reality, *ontology* or *metaphysics*, and the study of values, *axiology*. The third can be subdivided further into *ethics*, the study and evaluation of human conduct, and *aesthetics*, the concern with criteria of artistic judgment.

Just as it is possible to discern recurrent problems in the history of philosophy, it is also possible to recognize basic positions with regard to these problems. Frequently one refers to these basic positions as "philosophical systems" or "schools of philosophy." The "schools of philosophy" have often been founded by a great philosopher who defined the premises of a philosophical point of view and attracted a large following. The *Neoplatonic School*, for example, was developed by Plotinus in the third century A.D., although it derived many of its tenets from the earlier teachings of Plato. Some of the important philosophical positions such as idealism and realism developed into frameworks of philosophical thinking through the contributions of many philosophers over a long period of time and cannot be linked to the name of one particular man.

Physical educators have usually indicated the importance of philosophy for their profession by explaining the traditional philosophical systems and inferring the relevance of these positions for the practice of physical education. In the following sections we shall take a different approach. First we shall examine the influence of philosophy on physical education by considering the problem of monism-dualism in a historical perspective. In a second section we show how physical education can "goad one into philosophizing" by looking at some current problems in physical education with definite philosophical implications.

## AFFERENT CONCEPTS: EFFECTS OF PHILOSOPHY ON PHYSICAL ACTIVITY

### CLASSICAL GREECE

Physical education and athletics in classical Greece certainly occupy a place of honor in the long history of physical education. And when we think of Greece we think especially of the city state of Athens at the height of its development during the middle of the fifth century B.C. It is hard to find another period in history when physical education played such a vital and integrating role in the lives of children as well as adults. The ideal of the upper classes to be "good as well as beautiful" (the *kalokagathia*), had been extended to the common people in a democracy where the educational goals were no longer determined by military objectives. Artists portrayed bodily perfection and harmony on the vases and in the sculptures of an era that historians called the "Golden Age of Pericles" after the great statesman who led the Athenians to uncommon achievements in politics, literature, art, philosophy, and education. Pericles himself presented Athens as an example to the rest of the world, calling it the "School of Hellas" (562, p. 106).

The importance of physical education for the Athenians is best illustrated in

**FIGURE 7.2** Greek ideals of bodily perfection and harmony have been preserved in the remarkable sculpture that is characteristic of an era called the "Golden Age of Pericles." (Polyclitus' "Doryphorus" [spearbearer]. Roman copy of original of c. 450-440 B.C. Marble, 6'6" high. National Museum, Naples Photo, Alinari–Art Reference Bureau.)

Plato's dialogue the *Meno*, in which Socrates and Anytos discuss the education of the sons of some of the most illustrious citizens. Plato gives the following account of their conversation:

Socrates: . . . *I suppose you have heard that Themistocles had his son Cleophantes taught to be a good horseman. At least, he could remain standing upright on horseback, and cast a javelin upright on horseback, and do many other wonderful feats which the great man had him taught, and he made him clever in all that could be got from good teachers.*

*( . . . ) Or Pericles, if you like, a man magnificently wise—you know he brought up two sons, Paralos and Xanthippos?*
Anytos: *Oh yes.*
Socrates: *Well, he taught them (you know that, as I do) to be horsemen as good as any in Athens; he educated them in the fine arts and gymnastics and all the rest, to be as good as any as far as education goes.*

*( . . . ) remember Thucydides again—he brought up two sons, Melesias and Stephanos, and gave them a proper education; in particular they were the best wrestlers in Athens . . . (455, p. 100).*

It is not surprising that in the Athens of those days an uneducated person would be described as someone who "knows neither how to read nor how to swim" (454, p. 464). Yet, at the time of the dialogue between Socrates and Anytos, presumably toward the end of the fifth century B.C., a profound educational revolution had taken place. In drawing his examples, Socrates had no intention of glorifying the traditional educational system, but he wanted to point out to Anytos that in spite of the best that the old education could offer, the famous fathers had not succeeded in teaching their sons virtue. Socrates is speaking out for an education that places more emphasis on intellectual development.

The change toward a more intellectual education took place during the latter third of the fifth century B.C., while Athens was engaged in a struggle of

life and death with Sparta. Besides Socrates, there was a group of professional educators called the *Sophists* that was particularly effective in spreading educational innovation. The Sophists lectured about their new ideas to large groups of students who paid a fee to attend the lectures. Aristophanes, the great comic poet of that time, gives a biting comment on educational change when he describes a youth with a traditional education as modest, broad-shouldered, and well-built, spending his time in the gymnasiums, and Aristophanes adds: "But if your mode of life is up-do-date, you will have a weak body, a colour sickly pale, narrow shoulders, an immense tongue . . ." (18, p. 1002).

The traditional ideal of the *kalokagathia* expressed the harmony of the physical, moral, and intellectual qualities of man. If initially traditional education put undue emphasis on physical training, later it balanced physical education with music and literature. Underlying the educational innovations of the Sophists is a philosophy that regards man in the first place as an intellectual being. The next step is the total separation of physical and intellectual qualities, a dualism of body and mind that finds its ablest expression in the philosophy of Plato. In his political philosophy, especially in *The Republic*, Plato still seems to advocate the traditional education. The citizens of his ideal state must have "gymnastics for the body, and music for the soul" (456, p. 640). There is no doubt, however, that the soul or mind is the leading principle and more honorable than the body. In his speculative philosophy, Plato describes the body frequently as the contamination of the soul, even as a prison from which the soul can only escape through death (453, p. 62). It is not surprising then, that Plato distrusts the bodily senses and that, in his view, only the mind can have access to real knowledge.

The teachings of Socrates and the Sophists, and later the philosophic dualism of Plato, did not result in the disappearance of physical education. Long after Athens had ceased to be the leader of the Hellenic world, physical education continued to be taught in the schools and adults kept visiting the gymnasiums. The place of physical education as the integrative and powerful force of the total educational system had been increasingly taken over by intellectual pursuits. The gymnasiums (*gymnadzein*—"to exercise," and *gymnos*—"naked") became the meeting places for orators and their audiences and for philosophers and their students.[2] At the root of this transition from an education that emphasized physical development to an intellectually oriented education we can find an important change in the philosophical concept of man.

## RATIONALISM AND SYSTEMS OF PHYSICAL EDUCATION

The dualism of mind and body that Plato implanted in the history of West-

[2]It is interesting to note that the highly intellectual classical high schools of some Western European countries are called "gymnasiums."

ern thought was freshly stated in the seventeenth century by the French philosopher and scientist Rene Descartes. His famous phrase, "I think, therefore I am," is the philosophical expression of the superiority of the rational over the physical powers. According to Descartes, the body belongs to the realm of material substance (*res extensae*), it occupies space, and it is divisible. The mind or soul, on the other hand, is a thinking, spiritual substance (*res cogitans*); it is indivisible, and it does not occupy space. Descartes can describe the body, therefore, as a complicated, vital machine that needs to be joined to the soul to become a spiritual human being. He actually locates the spot where the soul affects and acts upon the body, at the pineal gland, a pea-sized structure at the back of the midbrain (586). It is this rigid separation of body and mind that prompted the English philosopher Gilbert Ryle to refer to Descartes' dualism as "the ghost in the machine" (490).

The philosophy of Descartes made a big impact on the Western society of the next centuries. His dualistic conception of man placed a great premium on the power of reason and led to an increasing reliance on the rational solution to problems. In a practical sense this brand of rationalism resulted in a strong faith in progress through the expansion of the powers of the mind, and a belief that most, if not all, problems could be solved by reason. Descartes' writings, in conjunction with the work of the English empiricists, also proved a great impetus for the development of the sciences. One of the contributions to science in Descartes' thinking was the recognition that complex material substance can be broken down into component parts that can then be studied in their simpler forms.

The influence of rationalism and the dualistic conception of man upon physical education is clearly evident in the emergence of the European systems of physical education during the nineteenth century. The German system started out as a patriotic *Turn* movement (somewhat comparable to gymnastics) under the leadership of Friedrich Ludwig Jahn, but it reached its characteristic form when Adolf Spiesz introduced the exercises into the German schools around the middle of the century. To adapt the gymnastics of the *Turners* to the highly intellectual school system, Spiesz first considered the movement possibilities of the body. In typically rational fashion he viewed the body as an object, a marionette, in which the joints form the natural dividing points. Ideally, the movements of arms and legs take place in straight lines along the geometrical axes of the body joints, and end positions are preferably held at ninety-degree angles to the body. In this way, Spiesz constructed his famous free exercises and group exercises from basic body positions such as lying, kneeling, squatting, and standing. The possibilities for variation appeared unlimited, and Spiesz carefully maintained a progression from simple to complex and from easy to difficult movement forms. His formal system of exercises fitted perfectly into the educational climate of the nine-

teenth century. The pedagogical purpose of the exercises was to bring the body under control of the mind, so discipline was foremost in the mind of the physical education teacher.

Although the Swedish system of physical education differed in many respects from the German system, the Swedish exercises clearly bore evidence of a rationalistic approach. For Per Henrik Ling, founder of Swedish gymnastics, and his followers the guiding principle was not movement possibility but rather movement utility. The Swedish educators were interested in the anatomical and physiological effects of exercise on the body. Because anatomical effects could best be studied and controlled in simple, isolated movements, functional human movements were dissected and reduced to component parts. The Swedish exercises had, therefore, many of the same mechanical and geometrical qualities as the German exercise. Through the dichotomy of body and mind, the body could be viewed as any other material object, a complicated machine that needed to be kept in good shape. This dualistic tendency that is so evident in the stilted and unnatural movements of the systems of physical education pervades the nineteenth century and even shapes the formal movements of the classic ballet.

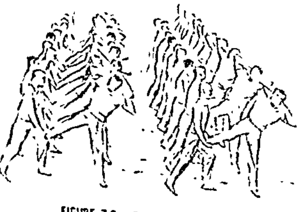

FIGURE 7.3 Dualistic concepts of mind and body shaped the stilted, unnatural systems of physical education of the 19th century

## RETURN TO THE UNITY OF MIND AND BODY

Even during the time in which rationalistic philosophy enjoyed its greatest influence, divergent philosophical positions were appearing, notably from philosophers and educators of the naturalistic tradition. The reactions against the dualistic conception of man and the unlimited faith in progress through reason culminated in our own twentieth century, especially after the shock of the two world wars. After World War I, the German philosopher and psychologist Ludwig Klages presented a theory of particular interest to physical education because it directly influenced the development of rhythmic gymnastics in western Europe. Klages' philosophy lay still within the dualistic tradition, but it marked a radical reversal of the prevalent conception when he opposed to the unity of body and soul the mind as a hostile element. For Klages the soul is the meaning of the body, and the body the appearance of the soul. Through this unity of body and soul, the human being partakes of the unity of the cosmos, the movements of wind and waves, and the rhythm of

day and night. The mind, however, disturbs the unity and harmony of body and soul. According to Klages, the mind strives for the eternal, that which is strange to life, and degrades the body into a machine (586, p. 106).

Klages' conception of man finds its expression in the rhythmical gymnastics of Rudolf Bode. In contrast to the geometrical, angular movements of the Swedish and German systems, the rhythmical movement is initiated at the center of gravity of the body and from there flows smoothly to the body's periphery. Bode points to the importance of eliminating the will (mind) from the flow of movement. Motion is evoked and sustained by music; the important thing is the emotional experience of realizing the unity of body and soul, not the mastery of mind over body (59).

After centuries of predominantly dualistic conceptions of man, our modern time has signaled the return to a monistic position that emphasizes the unity of mind and body. No longer is the mind considered as an immaterial substance that does the thinking, but rather as the thinking activity itself (116, p. 42). The mind finds its expression in the body but cannot be separated from it nor located in a particular part of its structure. This shift in the philosophical conception of man is not only evident in the pragmatic philosophy of the United States but also in the existential and phenomenological movements of the European continent. Progress in the sciences also has contributed to the image of man as a psychosomatic unity. The sciences have often presented empirical evidence leading to the re-evaluation of speculative theory. It would be hard, for example, in the light of the recent heart transplantations, to maintain the medieval image of the heart as the animated center of the human being.

The change to a monistic conception of man has not missed its effect on the theory and practice of physical education. The formal European systems of physical education no longer advocate the stilted, angular movements of the past but recognize the desirability of natural, functional movements related to concrete tasks. Children no longer lift arms and legs on command but explore possibilities and limitations in movement situations that involve them entirely in the solution of a problem. In the wake of the philosophical writings of William James and John Dewey, American physical educators earlier in this century rejected the formal European exercises and turned to functional movements in games and play. Although an increasing emphasis on physical fitness has overshadowed the play-and-games theory, physical educators today are keenly aware of the advantage of exercise forms that involve the "total" child. In contrast, the concern for physical fitness has resulted in the continuation of some of the old, "rationalistic" exercises, such as pull-ups, push-ups, sit-ups, and jumping jacks.

The changes in attitude toward the body are reflected in many aspects of everyday life. We can, for example, draw many inferences from a comparison of women's clothing in the Victori-

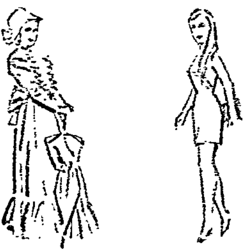

FIGURE 7.4 Clothing of the Victorian period contrasted with that of the present day reflects changes in philosophical concepts pertaining to the relationships between mind and body.

an period with that of the present day. The dualistic position was and still is often linked to the religious belief in the transient quality of the body and the immortality of the soul. The body or the "flesh" was frequently considered sinful, and it is not surprising that people attempted to cover it up as much as possible. The monistic view of the human being has nearly always allowed a freer expression of the body, because it does not reject it as an inferior part of the human being.

There is a danger that the monistic position leads to a naive conception of the unity of mind and body. Several existential philosophers have pointed out the differences between "the body I *am*" and "the body I *have*." When we are totally involved in a familiar game situation, we seldom consciously think about our own body. In a sense we "forget" our body in the immediate action of the game. A difficult move or a missed chance, however, may make us suddenly aware of the body we *have*, and we may even experience our body as a thing or an obstacle. These modes of experience can be of great value for the teaching of physical education. The distinction, which need not lead to classical or rational dualism, certainly merits the attention of the philosophizing physical educator.

## EFFERENT CONCEPTS: HOW PROBLEMS OF PHYSICAL ACTIVITY AFFECT PHILOSOPHY

In the introduction to this chapter we made the statement that, as a rule, science cannot provide the answers to questions of a philosophic nature. In this section we shall attempt to illustrate this point by discussing the problems surrounding physical fitness and the differences between the physical educator and the coach. Hopefully, such discussions may also contribute to an understanding of the term *physical education.*

### PHYSICAL FITNESS FOR WHAT PURPOSE?

Hardly any physical educator will disagree with the claim that physical fitness is one of the legitimate objectives of physical education. Elsewhere in this book physical fitness is defined as "the capacity to carry out tasks involving considerable muscular effort and thus requiring well-conditioned

neuromuscular and circulo-respiratory systems." In its objective formulation, this definition is a good example of the scientific approach. The capacity for muscular work is subject to scientific measurement, and there is the possibility to isolate the factors that determine such a physical performance. At present, the components of physical fitness most frequently mentioned are muscular strength, muscular endurance, circulo-respiratory capacity, and flexibility. Although the definition of physical fitness needs further refinement, our knowledge of anatomy and physiology, together with modern techniques of measurement, enable us to assess physical fitness with a reasonable degree of accuracy.

Because children and adults in our society live under similar conditions, physical fitness norms can be established through statistical sampling procedures. It is also conceivable that absolute as well as relative norms could be constructed through different scientific techniques that could allow for individual differences and the need for an emergency surplus of physical fitness. The applied sciences also help to evaluate the effectiveness of exercise programs in meeting physical fitness norms. The task of the physical educator with respect to physical fitness objectives would, therefore, seem relatively simple. To meet the physical fitness needs of his students, all that he would have to do would be to establish the desired norms and select the proper exercises. And, to be sure, many physical educators would agree that such is the correct way to go about it. But is the problem of physical fitness really that simple?

In 1933 Adolf Hitler emphasized in his notorious book *Mein Kampf* that physical fitness is more important for the welfare of a nation than the development of intellectual capacities:

> *The people's republic must presuppose that a physically fit individual with a good, strong character, full of determination and will power, is of more value to society than an intellectual weakling, even if the former has had little education. . . .*
>
> *The total education and instruction [of a young citizen] must be directed to give him the conviction that he is definitely superior to others. Through his strength and agility he must regain the belief in the invincibility of the entire nation (249, pp. 21–23).*

Physical fitness has here become a means toward an end with far-reaching implications for the individual and society. Hitler in effect gave his answer to the question: "Physical fitness for what purpose?" It is precisely this question that cannot be answered by science, because it deals with human values. By his demand that physical fitness lead to individual and collective feelings of superiority and invincibility, Hitler indirectly shaped the norms of conduct that became characteristic of Nazi Germany.

The physical education literature during the Nazi period gives ample evidence that the majority of German physical educators accepted Hitler's aims. With the Nazi ideology in mind,

physical fitness was taught with great emphasis on discipline as the collective enterprise of a superior race. The physical fitness programs were indeed geared to Hitler's wish that the army would not have to bother with fundamentals, would have nothing to do but "change already perfectly fit young men into soldiers" (249, p. 24).

Nazi Germany was by no means the only country where physical education, with the main objective of physical fitness, served the nationalistic tendencies of that time. The history of physical education abounds with examples of similar servitude. Some people, observing the connection between physical fitness and military preparation, have claimed that physical fitness is morally bad. Such an argument has no validity, because fitness could very well be the decisive factor in a rescue operation to save the lives of people in distress. Physical fitness in itself is neither good nor bad. It is rather the ends, toward which physical fitness is used, that are good or bad. One could hardly say that a man's eyes are morally bad because he got himself into trouble by looking at an immoral act.

If physical fitness is neither good nor bad, would it not be safer to remain uncommitted and provide one's students with scientifically adequate levels of fitness, without posing the question of purpose? After all, a physician does not ask questions about his patient's behavior once he has cured him. But perhaps the relationship between teacher and student is fundamentally different from the relationship between physician and patient.

Nearly ten years ago some schools in the United States introduced a colored trunk system to motivate the development of physical fitness. The color of a pair of trunks represented a certain fitness level, and the ideal was to reach the highest fitness level: a golden pair of trunks. On first impression this system may seem to be just another motivational device to enhance the physical fitness of the students, without any commitment to norma-

tive values. A closer inspection, however, reveals the system as a microcosm of values with a strong emphasis on competition and the survival of the fittest. In such a system the physically gifted rise rapidly to the top, whereas their less fortunate peers are doomed to wear trunks that will forever remind them and others of their inadequacy. The ideal result would be, of course, "a perfect zoo of nearly perfect monkeys" (459, p. 317).

In physical education it is extremely hard if not impossible to develop physical fitness in students, while maintaining the detachment of a surgeon. The contact between teacher and student is a pedagogical encounter that does not take place in a neutral atmosphere. Consciously or subconsciously, physical educators express values and establish rules of conduct by the way they approach a problem such as physical fitness. For the physical educator as an individual as well as for the profession as a whole, the question of the purpose of physical fitness or any objective of physical education is a vital ethical issue. Do we follow the aims of society, regardless of the consequences, as the physical educators in Nazi Germany did, or do we actively participate in shaping these aims? In this book the authors have expressed their ideas about these problems, and it is up to you to evaluate these ideas and start philosophizing about them.

## PHYSICAL EDUCATOR AND COACH

In the United States the tasks of the physical educator and the coach are often confused by the average citizen. When an outsider asks a physical educator how his football team is doing and hears that he does not coach at all, there is often the question "But what *do* you do?" Because in the United States physical educators often coach athletic teams and because coaches teach physical education classes, the confusion is not surprising. In most European countries, on the contrary, the differences between a physical educator and a coach are clearly recognized. One of the important distinctions is that, as a rule, the European coach does not teach physical education classes. In The Netherlands, for example, the Minister of Education has repeatedly refused to employ coaches in the schools, although in many respects the coaches have a better understanding of physical exercise than does the classroom teacher.

To understand the distinctions the Europeans draw between the physical educator and the coach, we must first look at the professional world of the former. In the preceding section we indicated that the physical educator, in emphasizing physical fitness, expresses values and establishes rules of conduct that point beyond the immediate concern of fitness to normative behavior in our society. The world of the physical educator is in touch with the values of society, and he tries to prepare his students for those values. Besides the social world in which normative behavior is important, the physical educator is also and above all concerned with the individual well-being of *every* person under his care

He must pay attention to the growth and development of retarded as well as advanced children in all physical, psychological, and social dimensions. The means through which the physical educator attempts to achieve his task are physical exercises of all kinds. His students, the goals, and the tools of his trade constitute the pedagogical world of the physical educator.

To understand better the world of the physical educator we must follow him in a specific pedagogical situation. Let us assume that he has selected a competitive sport to achieve certain educational objectives. It is very important to recognize that the physical educator uses the sport as a means toward certain goals. This means that he must have the freedom to manipulate the pedagogical situation, if he is to derive any benefit from it. There are many ways in which a physical educator can adapt a pedagogical situation to his objectives. He may change the rules of a game so that the weaker players get a better chance to participate; he may form teams so that he gets an evenly matched game; and he may stop the game at any moment to point out lack of cooperation or poor sportsmanship. This freedom to create the pedagogical situation is the physical educator's only guarantee of reaching his aims with respect to the individual well-being of all students and the social norms operating among them.

From this description it must be obvious how the world of the coach differs from that of the physical educator. The coach works only with a select group of students who are highly talented physically. The weak and the retarded are spectators on the fringe of the coach's world. Whereas the physical educator has many forms of physical activity available as tools, the coach must remain a specialist in only one or two sports. He can neither manipulate the rules of these sports nor choose sides to make the contest even. Whereas the aims of the physical educator are the individual well-being of his students and their social adjustment, the coach is often forced to work toward the single goal of winning the game. If we are honest, we must admit that in highly competitive athletics the coach must look at his players as the means to an end.

Many people may object to these distinctions, as they remember their days of interscholastic competition as rewarding "educational experiences." A summer job at the factory, however, may also have been such an "educational experience," but this does not imply that the factory foreman was an educator. There are, of course, many shades of gray between black and white, and it is possible that a coach places the individual and social well-being of his players above the winning of a game. Such a coach may even occasionally be successful; he may manage to combine the tasks of coach and physical educator. Such occasional success does not, however, disprove the fact that the worlds of the physical educator and the coach are only marginally related.

In the United States many coaches have graduated with a diploma in physical education and are therefore entitled to teach physical education classes. Sometimes the combination

works, but all too often one interest pushes the other into the background. Each individual must decide in his own conscience what he really wants to do and then try to do well what he has chosen. It is important to understand, moreover, that the distinction between physical educator and coach does not result in labeling the one as good and the other as bad. They are simply different, and it is high time that both physical educators and coaches come to recognize the differences.

In spite of all their differences, however, the worlds of the physical educator and the coach obviously have their meeting points. European interscholastic sports still have a very strong educational character, due to mass participation in which one school will often field as many as ten or fifteen teams in a particular sport. The preparation and selection of the teams are mostly organized by the students themselves with the help of the physical educator. Here he steps partly into the role of a coach. When he discovers talented players in his school teams, he will most likely encourage them to join a sports club, and that is where the real coach makes fine athletes out of them.

The distinctions between physical educator and coach may help us to gain a better understanding of physical education. In conclusion, we could state: "Whatever physical education is, it is not athletics." This is a negative statement but therefore no less important. To arrive at this conclusion, moreover, we had to define the world of the physical educator which forced us to clarify our thinking about physical education itself. How can we be sure that our reasoning and observations were true? The answer to that question is that we can never be *absolutely* certain. Somebody else may very well present an analysis that would compel us to revise our thinking. This would never be an arbitrary revision, however, but one based upon comparison, reason, and insight; in short, upon the search for wisdom we call philosophy.

## *SUMMARY*

Philosophy, as the search for wisdom, is concerned with real knowledge, not mere opinion. Philosophical knowledge, in contrast to scientific knowledge, cannot always be verified through experimentation. Philosophy differs from religion in that the philosopher relies on the power of human reason rather than on faith in his search for knowledge. One of the perennial problems in the history of philosophy has been the question: "What is man?"

*Afferent:* Philosophical conceptions about the nature of man have had a great influence on physical education. In the Greek society of the fifth century B.C., physical education formed an integrative part in a well balanced educational program until philosophers and sophists proclaimed a dualism of mind and body. The dualistic conception of man as a combination of separate entities led to the affirmation of the superiority of the mind and its intellectual qualities over the body. Physical education remained part of the Hellenistic school curriculum, but it had lost its vital role, as more and more emphasis was given to intellectual pursuits.

The formal exercises of the German and Swedish systems of physical education of the nineteenth century form a true reflection of the rationalistic spirit of the times, long after Rene Descartes had laid the foundations for this rational dualism. Descartes' philosophy led once again to a deep faith in the mind and its rational powers. The exercise systems were true products of their time. The formal movements were constructed to fit geometrical designs and were executed at straight angles, moving along straight lines. The German system aimed especially at the educational goal of bringing the body under control of the mind.

Reactions against the dualistic conception of man have culminated in our own century. The human being is no longer regarded as a combination of separate entities but as a unity of body and mind. In this monistic view, the mind is often seen as an expression of the body rather than a separate, superior entity. In physical education this new concept has resulted in freer movement forms through which the human being expresses himself in his totality. Movement exploration, games, and the dance have taken the place of many of the formal exercises of the past, although some of the latter still linger on.

*Efferent*: Physical education presents us with many problems that can "goad" one into philosophizing. One such problem is physical fitness, when, for example, the question is asked: "Physical fitness for what purpose?" In Nazi Germany physical fitness became a means to reinforce the feelings of superiority and invincibility of a nation. Physical educators directly contributed to Adolf Hitler's political ambitions by the way in which they emphasized physical fitness. In physical education the philosophical question of ends and means cannot be avoided.

Another problem deals with the difference between the physical educator and the coach. The aims of the coach are often limited to the winning of the game. The coach works only with the selected few and "uses" his athletes in a situation he cannot manipulate. The physical educator, on the contrary, can change the pedagogical situation to suit his aim of the optimum development of every student under his care, retarded as well as advanced. Can one man step from one world into the other and do justice to both?

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# Circulation and Respiration

# Chapter 8

The events represented by the headlines in Figure 8.1 are but dramatic examples of events that occur every day, events about which you should be vitally concerned. Preventable deaths are always a concern, and there is ample evidence that those attributed to degenerative diseases of the heart and circulatory system occur all too often in the United States (Figures 8.2 and 8.3). Lest one have the impression that the degenerative diseases are associated only with "old age," it should be reported that in an autopsy study of 300 American soldiers killed in action in Korea, 77 percent had significant coronary artery disease. Their average age was but 22.1 years, and their average body weight was 146 pounds (164). We now draw your attention to Figure 8.4. Does this shock you? Can you explain the jury's decision? If not, perhaps by the time you have read and studied this section of the book you will be able to understand the important point that this illustration is intended to make.

If you are to visualize your role in the prevention of such tragedies as those represented by the headlines, you must first come to some understanding of the systems of the body involved. If you hope to be a professional rather than a technician,

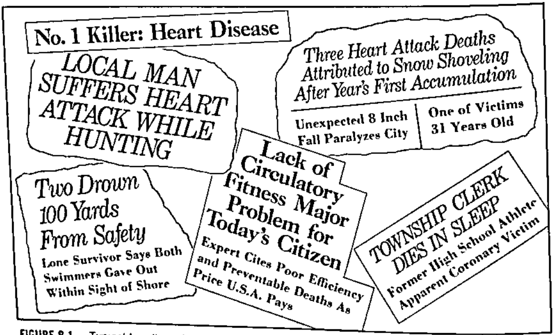



**FIGURE 8.1** Typical headlines in American newspapers.

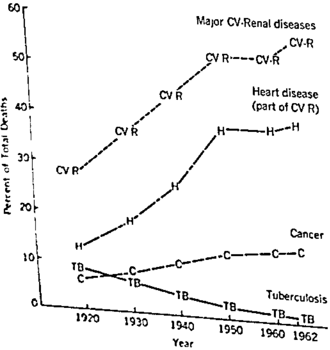



**FIGURE 8.2** Changes in major CV-r, heart, cancer, and tuberculosis death rates, 1920–1960. Adapted from *Statistical Abstract of the United States* (578).

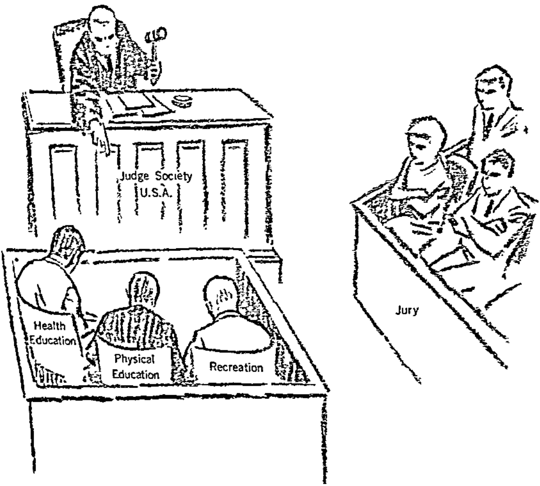



FIGURE 8.4 Since you failed to educate people properly with respect to the possible preventive measures they could take to at least minimize their chances of developing coronary artery disease, the jury finds you, Health Education and Physical Education, guilty of duplicity in the many preventable heart disease deaths which occur annually in the U.S.A. Recreation, you have been found guilty of the same crime for your failure to provide and promote adequate exercise opportunities for the strengthening of the heart and circulatory system.

The number of calories was also limited, to help bring his weight down.

Mr B was discharged from the hospital a little more than one month after his admission, feeling perfectly well except for slight physical weakness. His doctor encouraged him to increase his stair-climbing and walking slowly but steadily. Within several weeks he was able to go for rides in his car. Two months after his attack Mr. B. felt as well as ever, and was eager to resume his regular business life. His physician persuaded him to postpone his return to work for another two weeks, when he was allowed to go to his office for half of each day. By the end of two weeks he was working on his regular schedule again, but was careful to avoid unnecessary physical fatigue as

well as those business matters that caused emotional stress. He had lost twelve pounds of excess weight and had not smoked cigarettes since the day of his attack. He declared that he felt better than he had in many years.

This is a very brief account of the experience of Mr. B., one of the many thousands of persons who have recovered admirably from a "heart attack," known medically as coronary thrombosis (or coronary closure) with myocardial infarction (see Figure 8.5). Most doctors use the terms "heart attack," "coronary closure," "coronary occlusion," and "myocardial infarction" as having exactly the same meaning, although they are not in fact always synonymous. "Myocardium" is the Latin name of the heart muscle. The word "infarction" means death of tissue caused by loss of its normal supply of oxygenated blood. So the term "myocardial infarction" indicates that a small portion of the heart muscle has died because the artery which formerly supplied it with blood has been closed.

Heart attacks do not always cause the same symptoms that Mr. B. experienced. Sometimes the pain in the chest is extremely severe and may extend into the throat, shoulders, arms, and even into the back. It may be accompanied by profuse sweating, weakness, shortness of breath, nausea, and vomiting. On the other hand, attacks may occur with very slight pain or without any pain whatever. In such cases the symptoms may consist of unexplained weakness, sweating, or breathlessness. A great many people have closure of a coronary artery with little or no injury to the heart muscle.

The physician thus explained it to Mr. B.: "Actually, the heart attack that you had is not primarily a disease of the heart muscle. It is really the result of a condition in the arteries – the coronary arteries – that supply the heart muscle with blood.

"The heart muscle, or myocardium as it is called, is so thick and strong and constantly active day and night that it needs its own rich blood supply. The blood that simply flows through the chambers of the heart does not supply blood to the heart muscle.

"Therefore in the development of the human heart an extensive network of arteries has grown out from two main trunks, the right and the left coronary arteries. These main coronary arteries branch in somewhat the same manner as a tree. Every branch is smaller than the main trunk, and

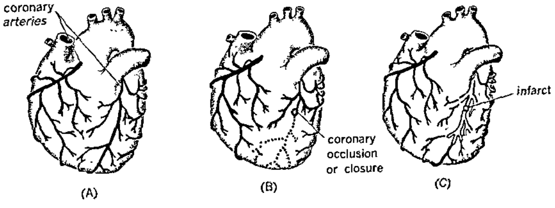



**FIGURE 8.5** *The heart: (A) coronary arteries, (B) coronary closure (occlusion or thrombosis), (C) myocardial infarct (death of cardiac muscle caused by reduction in blood supply). Source Heart Terms. Public Health Service Publication No. 1073*

report to us. Later, when you are strong enough, we may want to take x-ray pictures of your heart and lungs.

"If the healing progresses in you as it does in the great majority, you will probably be allowed to sit up in bed after about two weeks, and you may be sitting in a chair and walking about the room soon after that. Most people who have mild or only moderately severe attacks are well enough to be discharged from the hospital after about four weeks if there have been no complications.

"You might want to think of your injury as similar in some respects to the fracture of a bone in your leg. Even if a large bone were fractured, you would be comfortable within several days, but the bone could not support your weight until the injury had healed solidly. For much the same reasons we ask you to let the injury in your heart heal solidly before you call upon it to resume its full activity.

"If the injury is going to leave a small scar in the heart, this will probably be formed within the first two or three weeks. During the second month it should become firm and the new blood channels should become wider and carry ample blood to nourish the heart muscle that is dependent upon them.

"Both bone fractures and injuries in the heart vary in their severity and in the length of time required for healing, and, as with any kind of healing process, some people mend faster than others. That is why doctors would rather not estimate in advance exactly when you will leave the hospital and exactly when you will be at work again. But just as a bone fracture heals with care and time, so, if all goes well, several months should be enough to get you fully back into normal activity again—and that means back to your job.

"We have every reason to believe that you will resume your regular life although we may have to ask that you reduce some of your more strenuous physical activities."

The doctor explained to Mr. B. and his wife that a perfectly firm, well-healed scar may cause no trouble for the remainder of a long life. But he added that optimism can be overdone and lead to overconfidence and carelessness. In a few cases, complications may delay the healing process.

The doctor had the assurance of knowing that only in the minority of cases is a heart attack fatal, usually within the first few hours or days. The majority survive their first heart attack and most of them recover fully enough to enjoy many years of productive activity.[1]

This chapter is designed for the potential professionals who are concerned with the important scientific concepts relating your professions to the circulatory and respiratory systems of the body (with some attention directed to auxiliary systems). It is specifically meant for the professional who is not satisfied with a superficial, conditioned "knowledge," which leads him to promote strenuous exercise for what purpose he knows not, and which does not even motivate him to exercise himself.

## AFFERENT CONCEPTS

### GENERAL FUNCTION AND ANATOMY OF THE CIRCULO-RESPIRATORY SYSTEM AND RELATED SYSTEMS

The primary function of the circulatory system may be stated in one simple

[1]This information has been reproduced by permission of the American Heart Association from the pamphlet "Heart Disease Caused by Coronary Atherosclerosis."

word—"transport." It transports essentials like glucose and oxygen to the cells, and by-products of metabolism, such as carbon dioxide, from the cells.

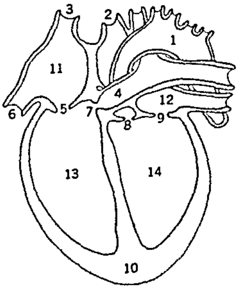
There are four basic components of respiration: lung ventilation or breathing; external respiration or the exchange of oxygen and carbon dioxide between the air sacs of the lungs and the blood; internal respiration or the exchange of oxygen and carbon dioxide at the cell membrane; true respiration or the actual oxidative process within the cells.

In discussing the functional parts of the circulatory system, it is most logical to include the blood, the heart, and the vascular bed. The plasma portion of the blood is primarily water, which acts mainly as the solvent. The remainder of the plasma, about 10 percent, is composed of dissolved solids and the gases, oxygen and carbon dioxide. Among the more important solids are nutrients for the cells such as glucose, lipids (fats and fatlike substances), and amino acids. Important ions, such as sodium, potassium, calcium, magnesium, chlorides, bicarbonates, and phosphates, are also present in amounts controlled within very precise limits. The plasma also contains the important blood proteins fibrinogen, albumin, and the globulins, all of which contribute to blood viscosity and the osmotic pressure of blood. Fibrinogen is essential to blood clotting; the gamma globulin fraction is concerned with immunity against certain foreign substances The plasma also carries all-important enzymes, antibodies, and hormones, as well as certain waste products to be removed by the kidneys.

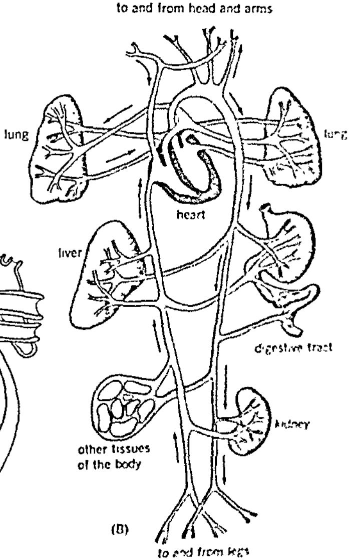
The formed elements or cells constitute about 40 to 45 percent of whole blood. The cellular portion is made up almost entirely of **erythrocytes**, or red blood cells; this percentage is known as the hematocrit. The red coloring matter, or **hemoglobin**, in these cells carries nearly all the oxygen and about half of the carbon dioxide transported by the blood. The **leukocytes**, or white cells, are less numerous than the red cells and are primarily concerned with fighting off infections. By making a "differential" white-cell count the physician can gain further insight into infections and better determine the cause of infection; the different kinds of white cells appear to increase as a result of different kinds of infection (acute, chronic, parasitic, and so on). The last of the formed elements, the **platelets**, are involved in the vital blood-clotting process.

The heart, composed of specialized tissue known as cardiac muscle, is innately rhythmic. It has its own rich blood supply (the coronary arteries are illustrated in Figure 8.5) and needs nutrients and oxygen in order to function, just as any skeletal or smooth muscle does. Consisting of four chambers and a series of valves (Figure 8.6A), it serves as the pump that circulates and recirculates the fluid medium (blood) throughout the closed vascular system. The right atrium receives the deoxygenated or "spent" blood from the body; the left atrium receives the freshly oxygenated blood from the lungs. The right ventricle pumps the deoxygenated blood to the lungs; the left ven-

1 aorta
2 pulmonary vein
3 superior vena cava
4 pulmonary artery
5 tricuspid valve
6 inferior vena cava
7 pulmonary valve
8 aorta valve
9 mitral valve
10 apex
11 right atrium
12 left atrium
13 right ventricle
14 left ventricle




(A)




(B)

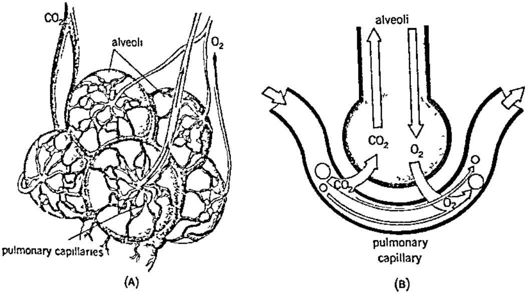



FIGURE 8.7 Oxygen and carbon dioxide exchange between alveoli of the lungs and pulmonary capillaries

flow varies directly as the fourth power of the diameter. In other words, doubling the diameter would increase flow sixteen times.

The actual macroscopic parts of the respiratory system are illustrated in Plate 1, which also depicts the basic elements of oxygen and $CO_2$ movement at the alveolar-pulmonary capillary exchange area in the lungs (see Figure 8.7). The opposite, of course, occurs at the tissue level where $O_2$ is diffused *to* the tissues and $CO_2$ *from* the tissues to the blood.

The excretory system and the liver are closely related functionally to the CR system. The excretory system, composed of the kidneys, skin, respiratory system, and digestive tract, is concerned with the removal of waste products. The kidneys (Figure 8.8) filter the blood (about one fourth of the blood volume is filtered per minute) and excrete water, excess materials, and waste products, such as urea, uric acid, and creatinine. In addition to water, some $CO_2$ is eliminated through

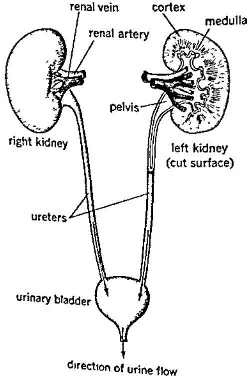



FIGURE 8.8 The urinary system and the kidneys. By permission from A. C. Guyton. *Function of the Human Body*. Philadelphia. W. B. Saunders Company, 1964, p. 9.

the skin, although most of the $CO_2$ is blown off by the lungs. Some water vapor is also lost in ventilation. The waste products eliminated by the digestive tract in the form of feces are primarily the end products of digestion, although small and variable amounts of water are also lost in the feces.

Much of the detoxification of blood is accomplished by the liver. It is especially well situated for this function (see Figure 10.1) because the blood leaving the intestinal absorption areas flows first through the liver. Much of the absorbed bacteria is destroyed in the liver. It also removes ammonia that results from protein metabolism and converts it to urea. In short, the liver removes (or converts) many waste, foreign, and toxic substances found in the blood stream. The liver also acts as a storehouse for blood in that its sinuses or cavities are capable of storing several hundred milliliters of blood.

## FUNCTIONS OF THESE SYSTEMS IN EXERCISE

As one would expect, the circulatory system is called upon to increase its transport of essentials to the cells and of waste products from the cells during muscular exertion. This need, of course, is directly related to the intensity and duration of exertion. The limitation in certain kinds of activity is partly imposed by the eventual failure of this system to meet the demands of the tissues, although the ability of the tissues to *get* the essentials provided by the CR system is perhaps an even greater limiting factor.

Total body blood flow, or cardiac output, is increased in even the mildest activity. It may increase to as much as 35 liters per minute in a highly conditioned male, which may represent as much as a sevenfold increase over resting cardiac output. This increase (up to a certain point) is the result of somewhat proportional increases in heart rate and stroke volume. Some researchers have presented evidence that exercise causes the stroke volume of sedentary individuals to increase very little, and that the increase in cardiac output is due almost entirely to an increased heart rate (483). Whatever the mechanism, the increased cardiac output speeds delivery of essentials to and waste materials from the working muscles during exercise.

Because of increased blood flow and the constriction of arterioles in nonparticipating areas of the body (such as the stomach and kidneys), systolic blood pressure rises during exertion. This increased working pressure, along with a simultaneous arteriolar dilatation in the muscles, means increased blood flow through the working muscles. Flow to the brain remains relatively constant and blood flow to the heart muscle is increased (Figure 8.9). Thus the blood not only is circulated faster; it is selectively circulated to the areas where it is most needed at the expense of portions of the body that are relatively nonessential during exertion.

There is a possibility that the spleen, which is especially rich in red blood cells, ejects some of these "reserve" cells into circulation during exercise. This would increase the blood's oxygen and carbon dioxide–carrying capacity.

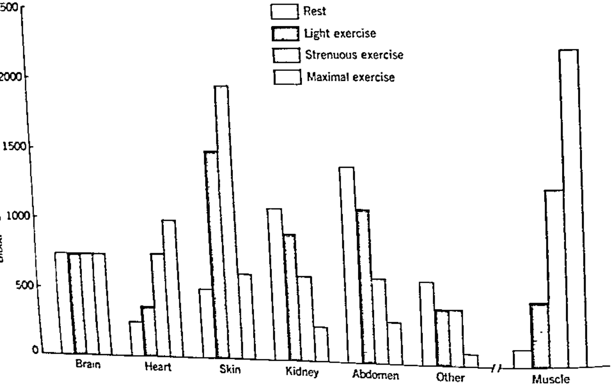



FIGURE 8.9 Effects of increasing exercise intensity on blood flow through various parts of the body. Adapted from Chapman and Mitchell (99)

During even the mildest exertion there is an increased demand for oxygen by the cells. In response to this increased $O_2$ requirement, the entire respiratory system steps up its activity. The actual degree of increase in respiratory functions depends upon the intensity and duration of the exertion. Both the depth (tidal volume) and the rate of breathing increase so that, in a trained man, the ventilation rate may increase from a resting level of 6–10 liters per minute to as high as 120–150 liters per minute (Figure 8.10). At the same time, decreased venous $O_2$ and increased venous $CO_2$ improve the exchange of these gases at the lungs because of the greater concentration differences across the gas exchange membrane. The stepped-up ventilation and the increased diffusability of $O_2$ and $CO_2$ lead to a greater external respiration (gas exchange between alveoli and pulmonary capillaries). There is also a greater difference in the oxygen content of the arterial and venous blood: more $O_2$ is actually taken from the blood by the tissues. This larger arterial-venous $O_2$ difference is primarily due to the greater blood pressure and to decreased $O_2$ and increased $CO_2$ within the body tissues. There are at least two other possible explanations: (1) it is possible that chemical changes

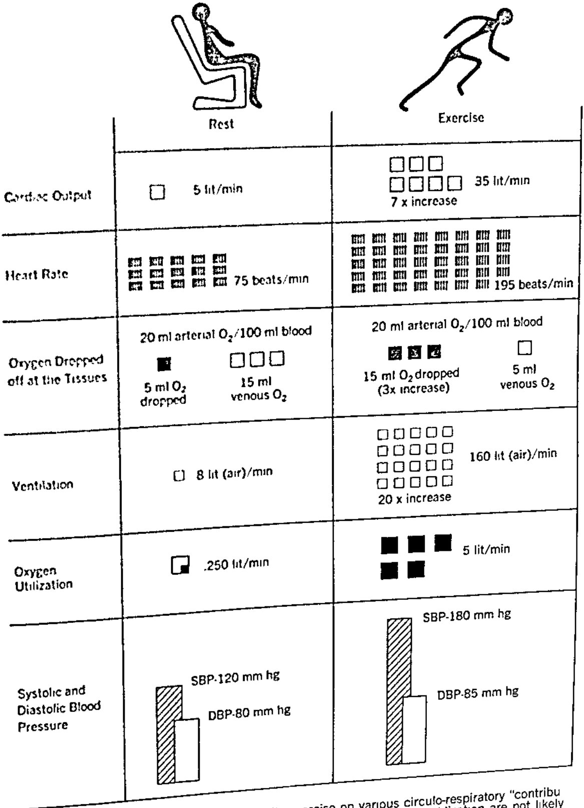



**FIGURE 8.10** The effects of maximal intensity exercise on various circulo-respiratory "contributors." The increases represented for cardiac output, ventilation, and $O_2$ utilization are not likely to be so great in the untrained person.

in the cell membrane allow for easier passage of blood gases (increased cell permeability); (2) changes in osmotic pressure may also aid gas exchange at the cellular level. During strenuous exercise the $O_2$ drop-off may increase threefold—from about 5 ml/100 ml blood at rest to 15 ml/100 ml blood (Figure 8.10). This means that the rate of internal respiration is also increased considerably.

As a result of the just mentioned changes, oxygen utilization may increase to as high as 4000–6000 ml/min from a resting value of 200–350 ml/min (Figure 8.10). If the $O_2$ utilization does not equal the $O_2$ requirement, a person can still continue activity until he reaches his maximal $O_2$ debt tolerance. This ability of the muscles to function anaerobically (without $O_2$) allows us to perform tasks that we otherwise could not perform. Generally speaking, sprints are considered $O_2$ debt-producing or anaerobic events, whereas distance events are aerobic or steady-state events. When the respiratory and circulatory systems are able to keep up with the $O_2$ requirement, then $O_2$ utilization and heart rate level off and one can continue this effort for a longer period of time. This leveling off, referred to as "steady state," can only be observed in submaximal work tasks, not in all-out exertion. For example, one would not reach steady state while sprinting at full speed to catch a bus, but steady state might easily be reached in a less than all-out effort, such as walking to catch the bus or even in cross-country hiking.

Blood volume is affected to a large extent by the kidneys' excretion of water. During exercise blood flow to the kidneys is reduced and therefore less blood is filtered. As a result, less urine is formed and blood volume is reduced less severely. It is probable that the antidiuretic hormone of the posterior pituitary, which increases renal water reabsorption, comes into play to further conserve plasma water. These renal functions help to maintain systemic blood pressure and also provide additional water for heat dissipation through sweating.

It is obvious that increased ventilation results from exercise. One of the most powerful stimuli for this increase is excess $CO_2$ in the blood. By increasing $CO_2$ removal during exercise, the respiratory system plays a very important role in the maintenance of a nearly normal blood pH value (the measure of acidity). This is important because the blood pH must be maintained within very narrow limits: about 7.1–7.5.

As one would expect for an organ with some five hundred functions, the liver contributes to exercise indirectly in many ways; attention here is focused on three of the more direct roles played by the liver in exercise.

Adequate glucose levels in the blood and tissues are maintained to a large extent by the liver's release of stored glycogen (glycogenolysis) and even by the conversion of nonglucose nutrients, such as fats, to glucose. In this fashion the liver helps control blood glucose levels during exercise.

Exercise can continue anaerobically (without sufficient oxygen) for a limited

period of time (see oxygen debt, page 182). Scientists formerly believed that the liver's conversion of lactic acid to glycogen or glucose, in the presence of $O_2$, was essential to the payment of the $O_2$ debt and, of course, to maintaining a steady state performance. There has recently been some doubt cast upon this theory, however, so that is not certain whether the fact that the liver *is* capable of this lactic acid conversion is a major factor in endurance activities.

By converting lactic acid, however, the liver plays a role in maintaing blood pH within normal limits and it is possible that this conversion of lactic acid also increases the $CO_2$ carrying capacity of the blood.

## EFFERENT CONCEPTS

### EFFECTS OF EXERCISE ON CIRCULO-RESPIRATORY AND RELATED SYSTEMS

Because any effects that physical education and/or formal recreation programs may have on the actual integrity of the circulo-respiratory system would, naturally, be exerted only by the consequences of exercise, the efferent concepts have almost exclusively to do with the effects of regular physical exercise rather than formal physical education per se. That is, the effects involved here do not depend on a "physical education class," but rather on what the individual *does*, whether it is in a formal class situation or not. This does not imply that there are not "psychological" factors involved. As you will see, this is far from the case. The importance of the CR system in health and fitness cannot be overemphasized. The healthy and fit circulo-respiratory system has been associated by most physicians and physiologists with high levels of general health. The primary benefits to be derived from a functionally efficient cardio-respiratory system are threefold: improved work capacity, increased efficiency in daily living, and prevention or delay in the onset of certain chronic degenerative circulatory diseases. It is fitting, then, that the concepts concerning the circulo-respiratory system should be discussed under these specific headings.

#### Work Capacity

Although physiologists have not identified the exact mechanisms involved in determining the working capacity of human beings, much has been learned about the adjustments that are made to the demands of activity. There is no question that certain critical factors determine an individual's work capacity for a given task. It matters not whether the task is "work" or "play" —the same factors are involved. At this point it would be well to review briefly the distinction between circulo-respiratory fitness and muscular endurance. You will recall that circulo-respiratory fitness involves the capacity to persist in rather generalized, total body tasks. On the other hand, muscular endurance involves a more localized part of the body, the limit for which seems to be established in the muscles or muscle groups involved and not by the inability to supply adequate

oxygen to the tissues. The work capacity we refer to as associated with circulo-respiratory health and fitness, then, is generalized and involves a major proportion of the total body. If this picture of the CR capacity is kept clearly in focus, we realize that the critical factors determining the working capacity of the individual are the oxygen requirement of the task, the oxygen debt tolerance, and the maximal oxygen intake.

OXYGEN REQUIREMENT OF THE TASK The energy for contraction of the muscles involves the use of oxygen. Obviously, the greater the metabolic demands of the muscles, the greater the $O_2$ requirement. In other words, the more intense the exercise or the work task becomes, the greater is the demand for oxygen. This demand of the tissues for oxygen is referred to as the oxygen requirement of the task. It follows logically that the greater the $O_2$ demand per minute, the less likely it is that the circulo-respiratory system can meet these demands, a factor that is an important determinant of the length of time one can perform a given task.

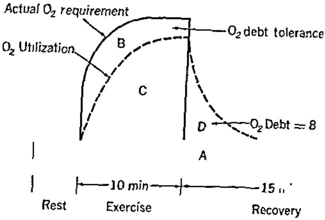
OXYGEN DEBT TOLERANCE When the demand of the task exceeds the capacity of the CR system to meet the oxygen requirements of the tissues, a deficit exists. Because oxygen is not actually required for the muscle contraction itself but apparently is involved only in the removal and conversion of waste products resulting from contraction, a considerable amount of work can be done in spite of this apparent deficit. Although the exact mechanism of oxygen debt and, in fact, the role that oxygen plays in the energy cycle has not been clearly established, it is known that the organism is capable of functioning with an apparent oxygen deficit. The level to which this deficit can be built before one must cease working is called oxygen debt tolerance. The term *debt* refers to the fact that following the completion of the task, oxygen continues to be delivered to the tissues in amounts above resting levels (breathing continues to be "heavy") until the deficit is eliminated. It is obvious that, for a given task, an individual with a larger oxygen debt tolerance has a greater work capacity.

MAXIMAL OXYGEN INTAKE FOR A GIVEN TASK The third factor involved in determining work capacity—maximal oxygen intake for a given task—completes the equation:

$$\text{Work Capacity (minutes)} = \frac{O_2 \text{ Debt Tolerance (in liters)}}{O_2 \text{ Requirement (in lit/min)} - O_2 \text{ intake (in lit/min)}}$$

The higher the $O_2$ intake during the task (given a constant $O_2$ requirement) the slower will be the accumulation of an oxygen debt. The relationship between these factors and work capacity for a given task is illustrated in Figure 8.11. An increase in work capacity can be brought about by one or a combination of the following factors: (1) increased maximal $O_2$ intake, that is, increased aerobic capacity; (2) increased oxygen debt tolerance; (3) decreased oxygen requirement of a task. There is

**FIGURE 8.11** *The role of $O_2$ requirement,* $O_2$ utilization, and $O_2$ debt tolerance *in determining* work capacity. $A = O_2$ utilization at rest and what it would have been had the exercise not "intervened." $B =$ the $O_2$ deficit due to difference between requirement and actual utilization. $C = O_2$ *actually utilized during* the exercise. $D = O_2$ debt: *the* amount of $O_2$ *utilized, over and above* what the man *would* have used (*at rest*) *had he not* exercised. Notice that $O_2$ debt $= O_2$ deficit *($D = B$)*, as it should.




evidence that all of these can result from training. Figure 8.10 depicts how these factors, singly or combined, can increase work capacity. The exact mechanisms involved in these training changes are not well established, but they do occur.

It is fortunate that the heart rate is a reasonably valid indication of the physical intensity of an activity and, as such, really serves as a crude index of the value of an activity for development of circulo-respiratory capacity. In this manner a person can roughly determine whether the sport, exercise, or work task is effective in improving his circulo-respiratory fitness. Of course, the length of time involved in the activity is an important factor and must be considered along with the intensity of the activity. But it is reasonably certain that such an activity as bowling, which increases the heart rate little if at all, is not an activity conducive to promoting circulo-respiratory fitness in the healthy individual.

You should be aware of the basic concepts related to three special aspects of work capacity: effects of smoking, effects of sleeplessness, and effects of anemia.

SMOKING AND PHYSICAL PERFORMANCE

Statistical research has linked smoking to certain kinds of respiratory and circulatory diseases, although the mechanisms have not been precisely established. In addition, carefully controlled laboratory experiments have all yielded the following physiological results of smoking: (1) heart rate is increased; (2) blood pressure is increased; (3) peripheral circulation is reduced with accompanying skin temperature decreases as great as 15°F (27, 444, 498). A recent investigation by Westfall and Watts (604) indicates that significantly larger amounts of epinephrine are secreted in smokers. This would tend to explain the cardiovascular changes associated with smoking.

On the basis of the time segments obtained in the electrocardiogram we have calculated the relative work and rest phases of the cardiac cycle. Smoking caused a decrease in the rest phase (from 45 percent of control to 29 percent

during smoking) while heart rate increased eighteen beats per minute. By way of contrast, a moderate work load for three minutes on the bicycle ergometer caused a heart rate increase of twenty nine beats per minute (thirty seconds after exercise) and little change in percentage of rest.

There has been very little experimental work concerning the immediate effects of smoking on physical performance. Little, if any, effort has been made to establish the longitudinal effects of smoking on performance, but it has been shown that, as a result of cigarette smoke, the inclination for spontaneous activity in male rats is reduced from one third to one half (543, p. 317). Hand steadiness may be reduced as much as 330 percent after smoking a cigarette (543, p. 348). The majority of performance studies indicate that there is no apparent immediate effect of smoking on hand grip, speed of tapping, Harvard Step Test score, oxygen intake or debt, or net oxygen cost of exercise (242).

These studies all involved the acute effects of cigarette smoking in young smokers or nonsmokers and were *not* concerned with the longitudinal effects. At the present time one can only speculate as to the true effect of chronic smoking on athletic performance and work performance. There is a complete dearth of direct evidence. Unfortunately, it is still not known whether the well-documented effects of smoking on ventilatory function, heart rate, blood pressure, and so on, lead to reduced work efficiency.

Although there is no direct evidence with regard to the "wind-cutting" effect of smoking, there are several interesting possibilities that could explain the labored breathing often experienced by smokers during exertion. Cigarette smoking causes (1) a twofold increase in airway resistance; (2) a decreased pulmonary circulation; (3) an increase in blood carbon monoxide that cuts the oxygen-carrying capacity of the blood by as much as 5 percent; and (4) hyperlipemia, which reduces oxygen content of the blood (121). A recent study by Oring (440) indicates that smokers may well have significantly lower maximal breathing capacities than nonsmokers (see Figure 8.12). Although these smoking effects *individually* may not cause shortness of breath, and even *added together* may cause no problem during rest, under conditions of exertion they may

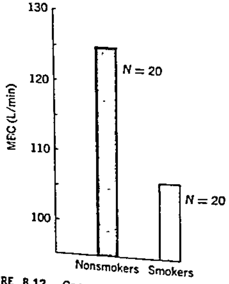
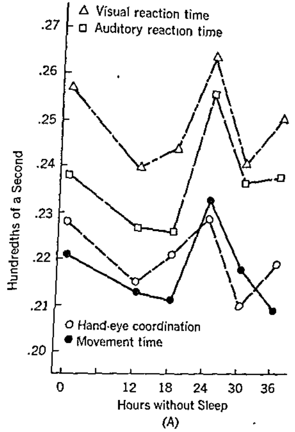



FIGURE 8.12 Comparison of smokers' and nonsmokers' Maximal Breathing Capacity. Average height and weight of two groups nearly identical. Data from Oring (440).

combine to exert a considerable handicap on ventilation.

INSUFFICIENT SLEEP AND WORK CAPACITY There is a widespread belief that lack of sleep is a *serious deterrent to physical* and mental efficiency; yet few experiments indicate significant curtailment of physiological function even when subjects have gone without sleep for as long as eight days (280, 481). Reaction time, body steadiness, and alertness are often impaired (163, 481), but these changes appear to be more psychological than physiological in nature. Holland (254) reported that one night's sleeplessness resulted in no impairment in discrete, short-term motor tasks but did result in impaired long-term performance. In a study conducted in our own laboratory (280), only the reaction time and movement time were significantly impaired after one night's sleeplessness, while the heart rate response to exercise was actually improved (Figure 8.13). Both reaction time and movement time returned to normal within twelve hours, even without sleep. It would seem that short bouts of sleeplessness, such as one night, are not as serious as we formerly believed. This is not meant as a recommendation of sleep deprivation, but that one need not allow his whole day to be ruined because he has had a sleepless night under trying circumstances.

ANEMIA If the blood has too few red cells or too little hemoglobin, the condition is called anemia. Typical symptoms are fatigue, lack of pep, a



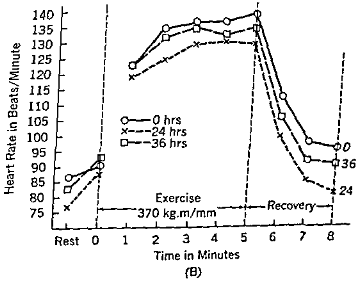




FIGURE 8.13 (A) Effects of up to 36 hours of sleep deprivation on coordination and movement time (B) Effects of 24 and 36 hours of sleep deprivation on resting, exercise, and recovery heart rate. Source: *Physiology of Exercise Laboratory, University of Toledo, Toledo, Ohio*

washed-out feeling, shortness of breath. If you believe you may be anemic, consult your doctor. It is not safe to treat this illness yourself.

Anemia can be brought about by improper diet, faulty absorption of food, loss of blood, injury to the marrow of the bones, and certain infections and parasites. Only a competent physician can diagnose the cause and prescribe proper treatment for specific types of anemia.

The body cannot function without oxygen. When anemia reduces the number of cells and the amount of hemoglobin, the blood can no longer carry enough oxygen for your body's needs.

The common causes of anemia follow:

1. Insufficient iron, protein, vitamins, or minerals.
2. Faulty intestinal absorption of iron.
3. Excessive loss of blood due to hemorrhage, ulcers, hemorrhoids, and so on.
4. Bone marrow damage.
5. Certain bacterial infections.
6. The exact cause of pernicious anemia is not known, but if diagnosed correctly it can be treated successfully.

Although there are some contradictory studies, there is some evidence in support of the claim that regular exercise does increase red-blood count, hemoglobin, and total blood volume (144, 312). In instances where such changes do occur, one of the obvious benefits is the increased oxygen-carrying capacity of the blood. It has been reported that there is an almost perfect positive correlation between total hemoglobin and maximal oxygen intake (21), but such a correlation may be spurious in view of the fact that there is also a high correlation between body weight and maximal $O_2$ intake and between body weight and hemoglobin (21).

It should be obvious that any person suffering from anemia will have an impaired work capacity because there is a reduction in the capacity of the blood to pick up and carry oxygen. If one gram of hemoglobin is capable of carrying 1.34 ml of oxygen during maximal exercise, what would the reduction in ml of available $O_2$ per minute be if a person's hemoglobin concentration fell from 15 grams/100 ml of blood to 10 grams, assuming he had in both instances a maximum cardiac output of 25 liters per minute?

Of course, such an anemia (10 g%) would likely result in reduced work capacity at far less than maximal efforts, and less severe anemias would likewise cut into work capacity at high intensity and/or long duration physical activity. The physical educator, health educator, and recreation worker should certainly be aware of this and should not be insensitive to the individual who is apparently not able or willing to "push himself" in an effort to develop stamina. Can we expect the Spartan attitude and hard work to improve endurance and work capacity when the cause is anemia?

## EFFICIENCY IN DAILY LIVING

The relationship between circulo-respiratory fitness and efficiency of daily

as high as it was at 9:00 A.M. Conversely, it appears that the sedentary or unfit individual quite often has a *higher* energy cost for a given task in the late afternoon when compared with the cost for the same task at the beginning of the work day. For these individuals it is quite plausible that this unfavorable diurnal variation in work efficiency might well account for much of the undue "fatigue" that occurs in the late afternoon and evening. The subjects in our experiment (male college professors) demonstrated definite beneficial changes in work efficiency as a result of a minimal four-week exercise program in which they exercised twenty minutes a day, three days a week (see Figure 8.14). After training, those who had previously exhibited the greatest decrease in work efficiency from early morning to late afternoon, experienced the most dramatic improvements in minimizing or reversing this unfavorable decrease in efficiency (281).

Although there is some objective evidence for the increase in efficiency of daily living associated with regular exercise, the evidence is certainly by no means sufficient to explain the mechanism in its entirety. But the evidence that we do have, coupled with the almost unanimous agreement that "when I am exercising regularly I feel better," leads to the conclusion that something must be said for circulo-respiratory fitness as a benefit for efficiency of daily living and for the feeling of well-being.

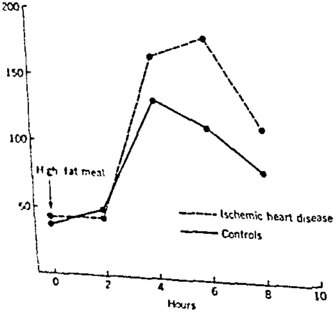



**FIGURE 8.15** Increase in level of circulating fats (lipemia), following a high-fat meal, in controls and ischemic heart patients. Adapted from Bouchier and Bronte-Stewart (63).

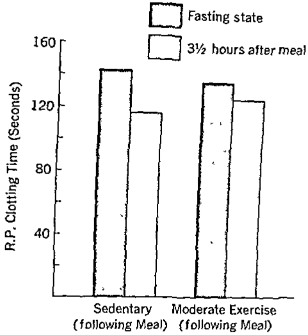



**FIGURE 8.16** The effects of a high-fat meal and subsequent inactivity or activity on blood clotting time. Data from McDonald and Fullerton (354).

## PREVENTION OR DELAY OF CHRONIC DEGENERATIVE CIRCULATORY DISEASE

There is considerable evidence, and such evidence continues to accumulate, that lack of adequate physical activity is a causative factor in the development of chronic, degenerative diseases of the heart and circulatory system. The following experimental and population studies provide the basis for some insight into the possible relationships between physical activity and the mechanisms involved in the chronic, degenerative circulatory diseases. It may be helpful to point out that there are two currently popular theories on the etiology of atherosclerosis and AHD. The lipid deposit theory holds that some fatty substance is deposited in the arterial walls, thus reducing the effective diameter of the blood vessel, whereas the fibrin deposit theory suggests that fibrin is deposited in the arterial wall, forming a thrombus and thus decreasing the effective diameter of the vessel. One should also remember that since both heart attacks and strokes can be caused by blood clots blocking important vessels, it is obvious that blood clotting (coagulation) and the dissovling of blood clots (clot lysis) are also important factors in cardiovascular disease and CV accidents.

### Heart Disease, Postprandial Lipemia, Blood Clotting, and Exercise

There is considerable evidence that in coronary and atherosclerotic patients there is a higher and more persistent postprandial lipemia or elevation in the level of fats circulating in the blood after a high-fat meal (63, 399, 415, 503). This "oral fat tolerance" test appears to be useful as a predictor of AHD, especially in older persons (244, 616). The typical results of the oral fat tolerance tests in coronary and normal subjects are illustrated in Figure 8.15. It appears that lipemia interferes with blood supply and oxygen delivery to the heart muscle (468), and there is evidence that postprandial lipemia shortens blood coagulation time (354) (see Figure 8.16).

Recent studies have demonstrated that exercise following a high-fat meal significantly reduces postprandial lipemia, hastens lipid clearance (94, 428), and nearly abolishes the postprandial acceleration of the blood clotting time

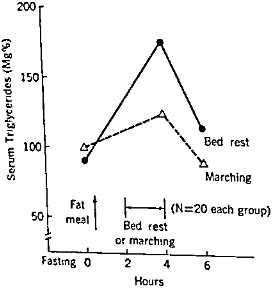



FIGURE 8.17 Effects of postprandial exercise (following a high fat meal) on postprandial lipemia. Adapted from Nikkila and Konttinen (428).

(354) (Figures 8.16, 8.17, and 8.18). The faster lipid clearance occurs even when exercise begins after lipemia has reached its maximum (354), as illustrated in Figure 8.19. This indicates that the mechanism for reducing postprandial lipemia is not altogether a matter of reduced intestinal absorption of fats as has been suggested (63). Whereas exercise *after* the meal is beneficial in this respect, Zauner and Burt (630) originally found no beneficial antilipemic effect of vigorous exercise *prior* to the high fat meal. Subsequent work by Zauner and Mapes (631) indicates that *mild* preprandial exercise resulted in significantly faster clearance after the meal. A more recent study by Zauner, Burt, and Mapes (632) indicated that vigorous premeal exercise hastened lipid clearance after the meal but did not reduce the maximum lipemic level reached. Mild exercise, on the other hand, not only hastened clearance but also reduced the maximum postprandial level attained. It remains to be seen whether improvement in fitness per se has any beneficial effect on postprandial lipid clearance, although recent work by Melling and Burt (379) indicates that five weeks of regular exercise significantly improved clearance. Another study comparing noncoronary convalescent patients with healthy medical students shows significantly greater acceleration of postprandial clotting times in the completely sedentary patients (354).

## Heart Disease, Blood Cholesterol Levels, and the Interrelationship of Diet and Exercise

The relationship between blood cholesterol levels and heart disease is discussed on page 218.

Mann (366) found that increased food intake in men did not cause obesity or high blood lipid levels if the excess caloric intake was expended in the form of exercise. Brown and co-workers (75) used rabbits to determine the effects of exercise in preventing coronary atherosclerosis, admitting that there was probably little application to human beings because of the differences in cholesterol metabolism. In rabbits on diets of 0.1 percent and 0.5 percent cholesterol, there was a lowering of total serum cholesterol after just four weeks of exercise. At the end of the comparatively short experiments (six, eight, and twelve weeks), exercise

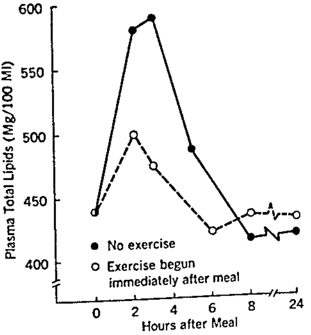



FIGURE 8.18 Effect of exercise (begun immediately after high-fat meal) on postprandial lipemia Adapted from Cantone (94).

tions of cockerels fed cholesterol and exercised daily for seven weeks as compared to a cholesterol-fed, no-exercise group. The author also noted a significant reduction in the formation of atheromatous plaques in the abdominal aortas of the exercised birds.

The effects of daily treadmill walking on nine university students were studied by Taylor, Anderson, and Keys (557). The exercise consisted of two hours at 3.5 miles per hour, 10 percent grade, and equaled 1280 calories' work. The diet was increased by 900 calories and the proportion of fat held constant. There was no change in mean body weight and no significant change in blood serum cholesterol concentrations. The authors conclude that this supports their hypothesis that serum cholesterol is related to the proportion

had no effect on the development of atheromata in the aorta and the coronary arteries. Exercise was also ineffective in speeding disappearance from the vessels once the atheromata were developed. It should be pointed out, however, that these rabbits were exercised only twenty minutes daily, which seems to be far less than a rabbit would normally exercise.

Rabbits were also used in an experiment by Myasnikov (416). These rabbits, however, were exercised to the point of exhaustion daily for six months. There was a marked decrease in the serum cholesterol concentration of the twenty-five exercise rabbits and also some reduction in the development of atherosclerotic changes.

Wong (620) reported a significant reduction in serum cholesterol concentra-

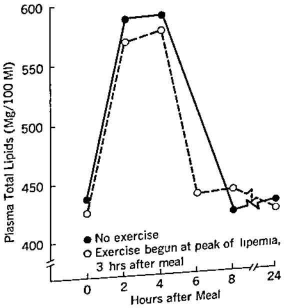



FIGURE 8.19 Effect of exercise (begun at peak of postprandial lipemia) on lipid clearance. Adapted from Cantone (94).

of total calories derived from fat, not to exercise. In a similar study of nine university students on a 1300-calorie daily treadmill walking program, the same authors again reported no serum cholesterol changes and no weight changes. They concluded that in calorie balance, serum cholesterol concentration is independent of caloric intake, absolute fat intake, and physical activity level when the kind of fat and the percentage of fat calories are constant.

Campbell (91) reports a cholesterol lowering effect of regular exercise in obese subjects independent of weight loss and diet but did not find the same for lean and muscular subjects whose cholesterol levels were lower to start with. Mann, Nicol, and Stare (365a) reported differences in cholesterol concentrations among Nigerian subjects in three separate areas of the country. Since total caloric and total fat content of the diet was similar and since there was a difference in muscular exercise, they believed that the physical work patterns may have had an effect in controlling serum cholesterol concentrations. Mann (366), reporting the results of a study of three subjects, states that young men consuming high-fat diets were able to double their caloric intake without increasing the level of their serum lipids or cholesterol so long as the surplus of energy was expended as heat and muscular energy. On the other hand, restricting exercise and allowing fat deposition doubled serum cholesterol concentration. The serum concentrations were returned to normal by food restriction and weight reduction

Other studies, too numerous to cite, have reported a decrease in blood cholesterol levels as a result of some kind of regular exercise. There are also studies that report no significant change in blood cholesterol levels due to regular exercise (77, 255). It should be kept in mind that the kind, amount, and intensity of exercise involved in the training are important factors, that is to say, one program may cause blood cholesterol reductions whereas another may not. For example, it appears that isometric training does not cause blood cholesterol reductions, whereas vigorous CR training does (92). Also, the initial cholesterol level, unless it is high, is not likely to be affected. With respect to diet per se and cholesterol levels, it is interesting to note that caloric restriction alone does not necessarily reduce cholesterol level. Even weight losses of forty pounds in obese subjects did not significantly reduce cholesterol levels in one study (158).

### Blood Clotting and Clot Lysis as Related to Exercise and Training

The results of studies on exercise and blood clotting time are not in complete agreement. Some report a shortening of coagulation time (499), that is, quicker clot formation, whereas others report no effect of exercise (297). Studies by Ogston and Fullerton (435) and by Burt and co-workers (85) shed further light on the effects of exercise on clotting and clot lysis and the effects of training on these measures (Figures 8.20 and 8.21).

Keys and his co-workers reported faster clotting times in business and

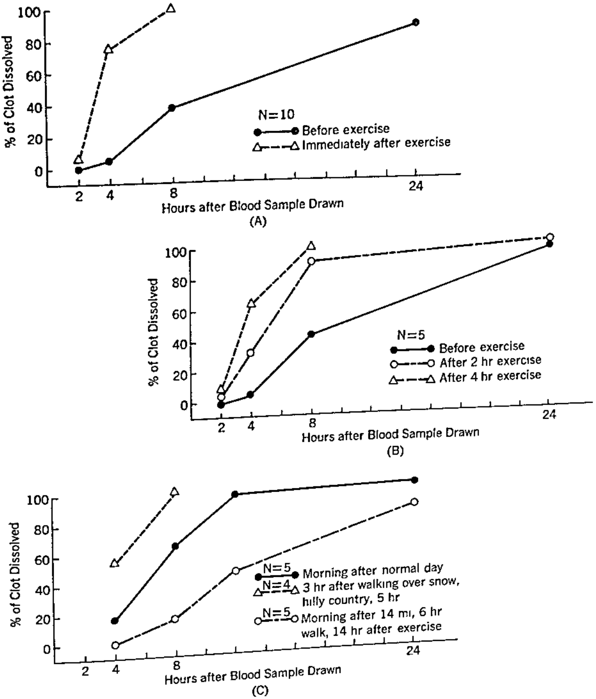
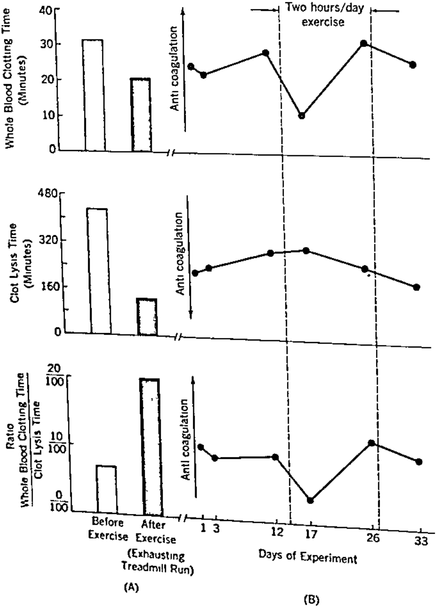



**FIGURE 8.20** Effect of exercise on time of clot lysis (dissolving of blood clot). For example, one can see that a clot dissolves faster after exercise (A) when the blood sample is taken immediately after exercise (completely dissolved in 8 hours). Lysis is faster after four hours of exercise than after two hours of exercise (B). Lysis is slower the morning after strenuous, long-term exercise (C). Data from Ogston and Fullerton (435)



Whole Blood Clotting Time (Minutes)
40
30
20
10
0
Anti coagulation
Two hours/day exercise
Clot Lysis Time (Minutes)
480
320
160
0
Anti coagulation
Ratio Whole Blood Clotting Time / Clot Lysis Time
20/100
10/100
0/100
Anti coagulation
Before Exercise
After Exercise
(Exhausting Treadmill Run)
(A)
1 3 12 17 26 33
Days of Experiment
(B)

professional men than in active railroad workers (307), and an animal study demonstrated a significant prolonging effect of seven weeks of regular exercise in clotting time (596).

## Regular Exercise and the Efficiency of the Heart

There is little doubt that regular and at least moderate exercise will reduce the resting heart rate (Figure 8.22); and up to a point, the more vigorous the regular exercise, the greater the reduction. Although mathematically this does *not* necessarily mean more total rest for the heart (length of each total contraction is also a factor), it obviously means that the heart rests more *often* and there *is evidence that the total work is decreased* and that both efficiency and coronary reserve are increased. Mallerowicz presents data indicating that there is less heart work and lower $O_2$ consumption *of the heart in trained persons.* He claims that this increases the coronary reserve, that is, allows a greater safety margin between normal, resting de-

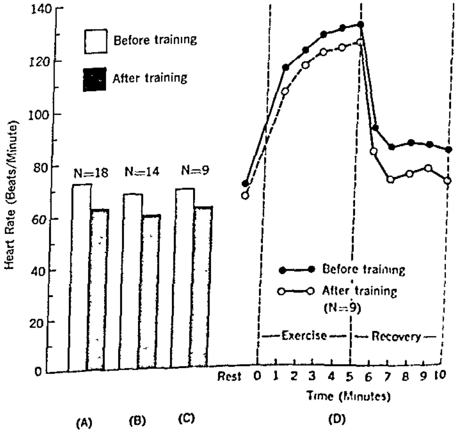



**FIGURE 8.22** Effect of training on resting heart rate (A, B, C) and on exercise and recovery heart rates (D). (A) data from F. Henry *(241)*; *(B) data* from Knehr (314), (C) and (D) data from Johnson, Updyke, and W Henry (281).

mands and the demands of increased heart work.

### Regular Exercise and the Development of Ischemic Heart Disease

There are scores of studies indicating that people in the more "active" occupations suffer less ischemic heart disease than those in sedentary occupations (see Figure 8.23). The limitations in using "occupation" or "last-known occupation" as a measure of the degree of activity are obvious. How long has a person been "at" this job? What are his other activities? The presence of other factors, for example, diet, emotional stress, and genetics, may affect the findings. The degree of regularity of exercise since birth has obviously not been available to the statisticians. The theories and the evidence pertaining to the many aspects of heart disease (postprandial lipemia, coagulation-

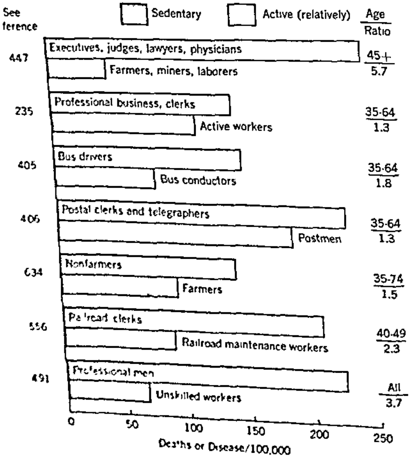



**FIGURE 8.23** Coronary heart disease and CHD deaths related to occupation—sedentary versus active. A summary of studies. "Age" refers to the age range of subjects; "ratio" is the ratio of sedentary to active. Data from references as cited on the ordinate.

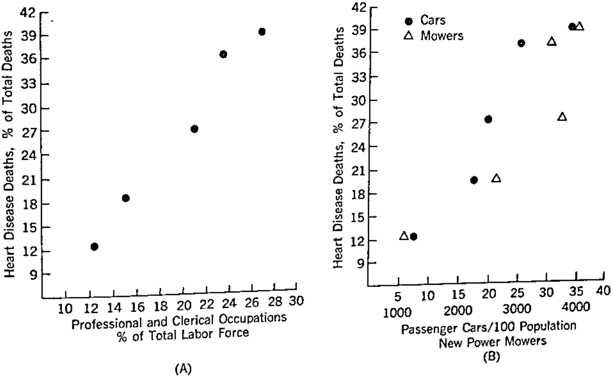



**FIGURE 8.24** Relationship between heart disease deaths, professional and clerical occupations (A), passenger cars (B), and new power mowers (B). Each plotted point represents a given year, 1920–1960 Data from *Statistical Abstract of the United States* (578).

fibrinolysis equilibrium, blood lipids, and so on) have been presented (pages 189–195). At this point, for the purpose of this discussion of claims for the benefits of exercise, it is enough to say that the evidence, both statistical and experimental, is strong enough to support the claim that the sedentary individual is more likely to develop ischemic heart disease. Some of this evidence is presented in Figures 8.23 through 8.27 and in Table 8.1. You will note that the results presented in Table 8.1 are somewhat contrary to those depicted in Figure 8.23. The explanation is not apparent. The other figures all provide indirect evidence concerning changes in society that tend to promote more sedentary living and, in some cases, the relationship to heart disease deaths.

**TABLE 8.1. Death Rates from Arteriosclerotic Heart Disease in the City of Chicago during 1951, Distributed according to Occupation**

| OCCUPATION | DEATH RATE NUMBER PER 100 000 White | Negro |
|---|---|---|
| Professionals, managers | 365 | 437 |
| Clerical and sales | 559 | 256 |
| Craftsmen, foremen | 370 | 279 |
| Service workers | 440 | 351 |
| Laborers | 813 | 826 |

SOURCE: Stamler, Kjelsberg, and Hall (537)

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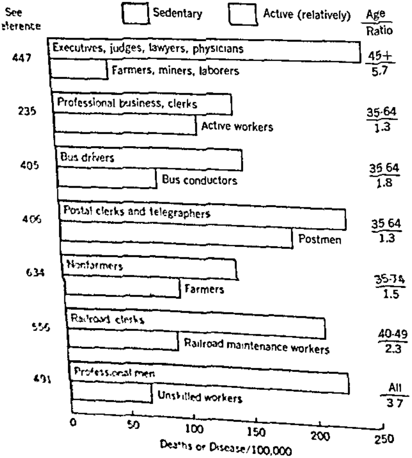


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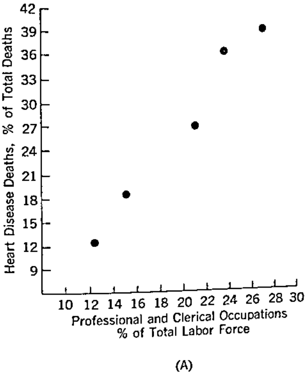


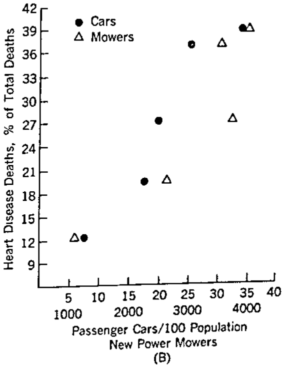


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genetic factors, improper diet, stress, lack of physical activity, and obesity. To this list smoking probably should be added. It is very probable that the process is a slow one and that at least several of the above-mentioned factors, if not all, interact with one another in the given individual and thus determine whether or not he will develop significant degenerative circulatory pathology. There has been no evidence that physical activity is detrimental in any way to the normal person, and there is a wealth of evidence to support the thesis that regular physical activity aids in preventing and postponing the onset of cardiovascular degenerative changes. Therefore, it appears that if a person is concerned about doing those things he can do in order to decrease the probability of suffering from these degenerative changes, he must logically include in his prevention program some regular activity that will lead to optimal circulo-respiratory fitness. A person cannot change the existing genetic factors, but he should consider the obesity, stress, diet, and smoking factors in designing an AHD prevention program. He should request that the important predictive items listed on page 224 be included in his physical examination when he reaches 35 or 40 and even sooner if he has a family history of heart disease, or has high blood pressure or a tendency toward obesity.

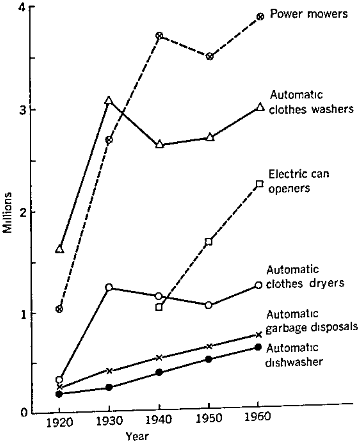



**FIGURE 8.26** Increase in automation in the United States, 1920–1960. Data from *Statistical Abstract of the United States* (578).

## MISCELLANEOUS CLAIMS FOR CR BENEFITS OF EXERCISE

*Does training result in slower, deeper breathing at rest and, if so, does this mean greater respiratory efficiency?* The evidence supports the claim for slower, deeper ventilation (314). It is questionable whether this necessarily means greater respiratory efficiency, because respiratory efficiency can mean many things. If we define respiratory efficiency as the energy requirement of the ventilatory muscles, then we must say that there is no evidence that resting respiratory efficiency is increased with training. However, a decreased rate of breathing would logically be ex-

capacity (as an index of physical activity level) and coronary heart disease, those with higher initial vital capacity have lower coronary heart disease risk.

*Does the increased blood pressure associated with exercise mean a healthier vascular system?* First, although it is obvious that exercise per se increases blood pressure, there is no evidence that training affects *resting* blood pressure at all. Second, there is no evidence that regularly increasing one's blood pressure is beneficial to the integrity of the vascular system. Based on the law of use and disuse (see page 611), one would suspect that this increased pressure might exert some beneficial influence on the elasticity of the vessel walls. It is possible that "disuse" hastens hardening of the arteries because the walls of the arteries are seldom subjected to stretch by increased pressure, but this is slim justification and certainly not adequate support for this claim.

*Does training result in cardiac hypertrophy and increased coronary circulation?* Steinhaus (543, pp. 90, 93, 181) cites considerable evidence that regular vigorous exercise can cause cardiac muscle hypertrophy; this should mean a stronger heart (see page 90). The claim that regular exercise causes increased coronary circulation is probably based on Eckstein's (162) classic work, which indicates that after blockage or occlusion of one of the main coronary arteries, regular exercise promotes the development or opening up of collateral or additional pathways that bypass the occlusion. However, it appears that the blockage or oxygen-lack stimulus must occur *before* this collateral circulation can develop (84). With respect to an increase in cardiac muscle capillarization due to training, there is some evidence that this occurs (543).

## ACHIEVEMENT AND MAINTENANCE OF ADEQUATE CIRCULO-RESPIRATORY CAPACITY

The exact type of circulo-respiratory training program that you recommend to a group of adults, prescribe for an individual, or utilize in a formal class situation is, of course, dependent upon certain very important factors. This is the first and most important principle of circulo-respiratory training. When you recognize the importance of this principle and put it into practice in your profession, you will have taken a vital step along the road to crossing the barrier that separates the professional from the technician. With a little effort, you should be able to list the factors that determine the kind and amount of exercise a given person should have if he or she wishes to achieve a higher circulo-respiratory capacity (see Table 8.2).

**TABLE 8.2 Factors Affecting Selection of CR Conditioning Program**

1. Health Status
2. Age
3. Sex
4. Current CR capacity
5. Desired general CR capacity or specific CR capacity

Science has not and probably never will establish strict and definite guidelines for any of these factors. Concerning health status, it is reasonable to say that you should never prescribe, recom-

mend, or require (depending upon your relationship to the person) *any* kind of program unless you are certain that there is no health deficiency or condition that makes exercise hazardous. This means a recent and complete physical examination, and this can be handled in numerous ways, depending upon your operational situation (schools usually require such certification). With respect to three of the remaining factors, age, sex, and current circulo-respiratory capacity, a sound principle is "*underexert* at first, until a reasonable acclimatization occurs."

This will allow a more normal and less "painful" adjustment period for the exerciser and will need to be based on common sense, yours and the exerciser's. The fifth factor, desired circulo-respiratory capacity, obviously determines the eventual kind and intensity of the program and is in turn related to the actual method of circulatory-respiratory training.

### General Principles of Circulo-Respiratory Training

OVERLOAD PRINCIPLE The overload principle simply means that stress must be placed on the system or systems whose capacity you wish to increase. In this case, you are dealing with the heart, circulatory system, and respiratory system, or, to look at it another way, you wish to improve the delivery and waste-removal mechanisms of the body. Certainly the neuro-skeletal-muscular system and the endocrine system are involved, but they do not bear the "overload" in the same sense if the program is properly designed to develop primarily circulo-respiratory capacity. That is, if the muscles are overloaded and become impaired *before* the capacity of the circulo-respiratory system has been taxed, then the objective has not been met. Use of the muscles is, in this case, primarily the *means* to an end, that end being circulo-respiratory overload. (Let us pause here to point out that the term *overload* is actually a misnomer in that once the circulo-respiratory system is truly overloaded it cannot function.) In a true circulo-respiratory "overload" activity the individual should be forced to discontinue only because of the inability of his circulo-respiratory system to meet the demands of the task. This is, admittedly, difficult to achieve in a pure form, but the closer you come to such a condition (that is, where local muscle fatigue is not a factor) the closer you have come to circulo-respiratory overload.

If any appreciable improvement in circulo-respiratory capacity is to occur, this overload must take place, and it must take place *regularly*. Because such an overload invariably causes an increase in heart rate, one might reduce this principle to a simpler form. The heart rate must be increased significantly and regularly for improvement in circulo-respiratory capacity to occur. What is "significant" and what is "regular"? Answers to these questions, while not as absolute as they should and hopefully will be, are dealt with later in this chapter, and obviously depend upon other factors such as age, current status, and desired circulo-respiratory capacity.

SPECIFICITY PRINCIPLE The principle of specificity is an important one and implies that training is highly specific. It is perhaps less applicable to circulo-respiratory capacity because the heart and lungs are "*general* servants" of the entire body. Because they are the primary organs involved in true and pure circulo-respiratory capacity, it is conceivable that they could become highly conditioned to handling delivery and waste removal at a very efficient and intensive rate so that they could handle any work requirement that does not exceed that rate. Assuming that the most demanding form of training is utilized, such a theory should hold. But the vascular system in the muscles per se may adapt to training and become more efficient in delivery and waste removal, and thus contribute to the total improvement in circulo-respiratory capacity. Therefore it is not quite so simple to separate the pure circulo-respiratory from the pure muscular efficiency changes.

At any rate, an efficient and highly trained circulo-respiratory system does render the person better able to persist in any activity where the *capacity of the circulo-respiratory system is a primary limiting factor*, even though more specific training in that activity will undoubtedly improve the capacity for that activity even further. Of course, where localized muscles are significantly involved in limiting work capacity, this is a different matter. For example, a swimmer may well develop stamina and a strong circulo-respiratory system, but for such a person to try to compete in the mile run, even if his circulo-respiratory capacity exceeded the demands of running a four-minute mile, he would not be immediately successful because of the different load placed on the muscles of the body, particularly the added load to be handled by the legs. But to work at any task where the local muscle demand was less than in swimming, he would be well equipped to demonstrate excellent circulo-respiratory capacity, no matter what the task might be.

In short, one kind of circulo-respiratory conditioning does not necessarily prepare a person for another activity, because localized muscle effort usually is involved. But as far as the circulo-respiratory system per se is concerned, there can be considerable beneficial carry-over.

## Specific Principles of Circulo-Respiratory Training

*Specific principles of circulo-respiratory* training, of course, are applied in the light of the general principles just discussed, and, as you will see, all have to do with the principles of overload and specificity in some way.

1. *The greater the proportion of the total body musculature involved, the greater the circulo-respiratory load.* That is, if the muscles of both the legs and arms are vigorously contracting, there is greater circulo-respiratory load than if either muscle group is working alone.
2. *The intensity of the circulo-respiratory load is partially determined by the proportion of maximal force exerted by the muscles and/or the frequency of exertions.* That is, if a given set of muscle groups

is working at 80 percent of maximal force, the circulo-respiratory load is greater than if they were working at 40 percent of maximal. Likewise, for a given percent of maximal force, more frequent contractions, say thirty per minute as compared with ten per minute, will result in a greater circulo-respiratory load.

3. *The greater the intensity of the exertion, the more rapidly the circulo-respiratory overload will be achieved.* That is, the greater the intensity of the circulo-respiratory load, according to Principle 2, the sooner the person's circulo-respiratory system will be working at overload.

4. *In a given person, the greater the intensity of the activity, the shorter the period during which overload can be maintained.* That is, the closer one comes to all-out effort, the shorter period of time that effort can be maintained.

These principles are straightforward enough. But how do we take advantage of them to formulate a training program to achieve optimal circulo-respiratory capacity? This is, of course, where the principle of specificity crops up again; it depends upon what one wants! Does the person want to be able to run a four-minute mile or a twenty-five minute four mile race or to swim for distance or just to develop good, general circulo-respiratory capacity? Obviously the miler does not train by running four miles every day at the four-miler's rate, the four-miler doesn't run a mile each day at the miler's speed, and so on. Though the program can be varied, one basically trains for what he wants to do.

The man wishing general circulo-respiratory capacity can combine intensity and duration. Although exercise physiologists do not have any definite answers, it appears safe to assume that the greater the *total* work of the heart (contractions) accomplished over as short a time span as possible, the greater will be the gain in circulo-respiratory capacity. Assuming they both started at the same circulo-respiratory capacity, a man whose heart contracts 6000 times during a daily one-hour walk (an average of 100 a minute) would not expect as much circulo-respiratory gain as a man whose heart beats 6000 times during a daily forty minute jog (an average of 150 a minute). A third man whose heart beats an average of 150 times a minute for sixty minutes would most likely exhibit a greater gain than the second man. This principle only takes us so far, unfortunately, and then drops us right in the middle of an abyss of ignorance! How long would the first man have to walk at 100 beats a minute to achieve what the second man would achieve? This is one of the very pressing needs for our profession; to be able to quantify the work output necessary to achieve *optimal* circulo-respiratory capacity. The picture is not all that bleak, however. The need is only to determine the *best* way. We know that circulo-respiratory capacity gains *can* be achieved by using the principles listed here.

Actually, a happy medium between intensity and duration is best. If more bouts a day can be added, this will help, and once a week is not going to accomplish the same gains as three, four or five times a week.

In summary, the following may be concluded concerning the principles of circulo-respiratory training:

1. *Overload is absolutely necessary.* In the normal person, it is doubtful whether any gain can be expected from programs in which heart rates of less than 120 per minute are attained. Sharkey (510) presents evidence that 180 is superior to 150, which is in turn superior to 120.
2. Specificity is important for specific *"events." The person should train basically at the distance and rate at which he intends to compete. Overload in* terms of both distance and rate can also be very valuable.
3. Although the exact combination of intensity, duration, number of bouts, and days a week has not been determined for general circulo-respiratory conditioning, we are led to conclude that *at least three times a week is necessary.* Furthermore, when the other three factors are held constant, greater intensity or greater duration or more bouts a day should lead to greater gains in circulo-respiratory capacity.
4. All of these principles must become subservient to the first principle discussed in this chapter. *Intensity, duration, and so on must be based upon the individual's current status, and you should err on the side of underexertion initially.*

## Specific Approaches to Circulo-Respiratory Training

CIRCUIT TRAINING Circuit training was originated at the University of Leeds in Great Britain. *Its purpose was to give* students a vigorous, all-around workout in a short time. Combining the elements of calisthenics, running, weight lifting, and the "competing-against-time" appeal of the obstacle course, *circuit training aims at the progressive* development of muscular and circulo-respiratory capacity. A general conditioning technique, *it can be loaded to* concentrate on specific weaknesses when it is set up on an individual basis. Although it is not a complete gymnastic system nor a recreational activity, many *who cannot enjoy other fitness activities* are enthusiastic about this system. The "near maximal" concept and the principle of progressive loading are integral parts of the "circuit," which includes *items for all parts of the body* as well as some sort of CR activity, such as running or rope jumping. Generally *speaking, the individual is competing* against himself, trying to increase the "dosage" or number of repetitions of each item while also trying to lower his time for the total circuit.

Following is an example of a beginning general circuit, involving very little equipment. *It is obvious that this* illustration includes exercises other than those that benefit CR fitness, but it has the advantage of diversity. An individual program can vary considerably and stress CR fitness a great deal more than this example. Incidentally, rope jumping (Item 6 in the example) has been shown to be an excellent CR fitness activity (33, 287).

*After familiarization with the circuit,* you can increase the items where endurance is not "near maximal"; when you reach the point where no more

SAMPLE OF A BEGINNING CIRCUIT FOR COLLEGE WOMEN

1. Jumping jacks—12
2. Bent-arm hang on high bar—20 seconds
3. Bent knee sit ups—10
4. Push-ups from knees—12
5. Toe-touches—10
6. Rope jumping—30 turns
7. Back extendors—12
8. Wrist curls—6
9. Jogging and walking—.5 mile*
10. Maximal vertical jumps—6

*Bench stepping may be substituted for an indoor program when space is limited

time can be shaved off, you should increase the intensity or duration of the various items.

An excellent little book, *Circuit Training*, by Morgan and Adamson (401) of the University of Leeds, is available for those interested in more detailed information for setting up circuits.

INTERVAL TRAINING Interval training was developed for endurance training, primarily in running and swimming, but the general principles are applicable to any kind of conditioning or training where staying power of *any* kind is essential. At least four elements are involved: (1) speed or rate, (2) distance or length of time, (3) rest interval, and (4) number of bouts or sets. Any of the four elements can be varied in order to increase the work load, or as a means of adding variety to the program. An example of how these elements can be set up follows.

Interval training has been used successfully in rehabilitation of cardiac patients. An excellent paper on the theory and specificity of interval training has been prepared by William Heusner (245).

CONTEMPORARY DANCE (MODERN DANCE) In such a program the emphasis is on movement and grace, although flexibility, muscular endurance, and CR capacity can be improved if they are specifically involved in the movements selected. In our culture, generally speaking, men have trouble with rhythmic exercises, but this appears to be more social than functional ineptitude. Although modern or contemporary dance is considered as an esthetic art, and is not a "strength" builder, it may well be unsurpassed for improving the combined qualities of grace, body control, balance, flexibility, and agility. (see Figure 21.3). In the more vigorous forms, dance also contributes to muscular endurance and CR fitness.

SPORTS ACTIVITIES If time and facilities are available, many will choose some competitive sport for exercise.

| ELEMENT | RUNNING |
|---|---|
| Rate | 1 mi/5 min (440 yd/75 sec) |
| Distance or time: | 440 yd |
| Rest int.: | 5 min |
| Bouts: | 4 |
| Variations: | When 4th bout does not produce excessive discomfort, shorten interval to 3 min. |

Swimming and distance running, although competitive sports, can be engaged in without an opponent and are excellent CR conditioners. Singles handball, badminton, tennis, squash, and paddle ball are enjoyable games and can be excellent conditioners, but appear to do little for flexibility and overall muscular endurance, and essentially nothing for strength. Some strength is certainly necessary to compete and have fun in these games and we would agree that some specific and localized muscular endurance is improved.

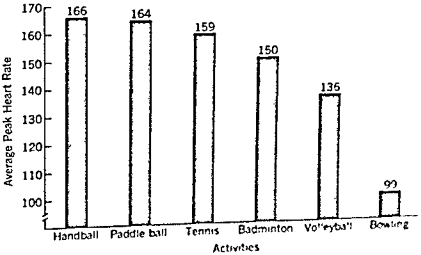
Golf, if it involves more walking and less waiting at the tee and on the fairway, can be a valuable fitness activity to a completely sedentary or older person, but soon reaches a point of no return, at least as far as physical fitness is concerned.

Bowling is obviously ineffective as a fitness activity except perhaps to improve the very specific endurance involved in the arm swing and ball release. One gets a fairly accurate picture of the CR value of the various activities by comparing average heart rates attained during actual competition and recovery heart rates following various exercises or activities (see Figures 8.28, 8.29, and 8.30). Based on heart rate and time involved, how would you rate the activities in Figure 8.30 as to their relative value for CR fitness?

One can also get a reasonably clear picture of the CR value of various activities by referring to the caloric expenditure table on page 338.

"AEROBICS" Major Kenneth Cooper's book entitled *Aerobics* (123) has provided a planned and rather specific prescription for CR conditioning. Based on one's fitness category (see page 214), Cooper prescribes specific weekly

**FIGURE 8.28** Peak heart rates in college male attained during various intramural contests. Data from Kozar and Hunsicker (321)



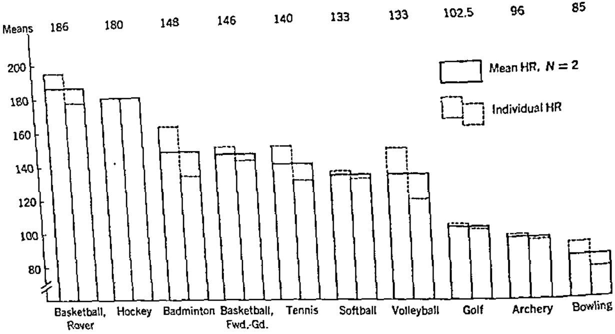



**FIGURE 8.29** Mean heart rate during women's competition (mean for entire contest). Only two subjects utilized, but application is index of *relative* strenuousness of activities for a given person. Data from a study by Skubic and Hodgkins (523).

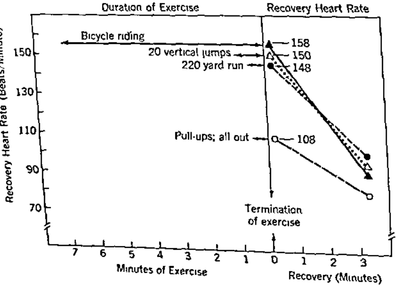



**FIGURE 8.30** Effects of various activities on recovery heart rates. Arrows represent length of time for exercise on time scale to left of zero. Data from Physiology of Exercise Laboratory, University of Toledo

amounts of exercise from any one or a combination of several activities including running, walking, cycling, swimming, stationary running, and squash, handball, or basketball; his program is based upon the accumulation of weekly points. It seems to us that every physical educator and recreation worker should have a copy of this little book at his disposal for purposes of suggesting specific exercise programs for the development and maintenance of CR fitness.

## EVALUATION TECHNIQUES; HEART DISEASE AND OTHER DISORDERS

### APPRAISAL OF CIRCULO-RESPIRATORY CAPACITY

Several laboratory tests are recognized as sound CR tests. For example, there are several good tests of maximal $O_2$ intake or aerobic capacity, one of which is Balke's (34) Standardized Treadmill Test. He has tested some 700 males, ages 18–65, and has classified men from very poor to superior on a scale of oxygen intake in milliliters $O_2$ per minute per kilogram of body weight. Balke classifies 35–40 ml/min/kg as "fair" and 40–45 as "good" (Figure 8.31).

Wahlund (593) has devised a test based on exercise heart rate that appears to be very successful for classifying degrees of CR capacity. His PWC *170* test (physical working capacity heart rate 170) utilizes increasing work levels on the bicycle ergometer until a heart rate of 170 is reached. He has even classified subjects according to disease states. The average healthy man is expected to attain a work level of 900 kg-m/min before reaching the 170 level.

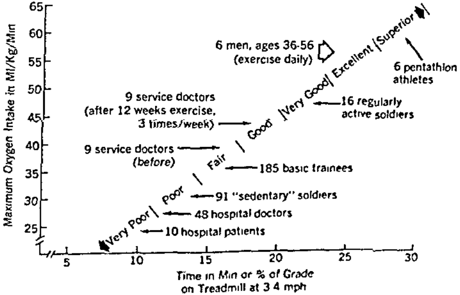



**FIGURE 8.31** Balke's classification of CR capacity in terms of maximum oxygen intake per kilogram of body weight. For example, a 70 kg man should be able to attain a maximum $O_2$ intake of 2450–2800 ml per minute to be classified as "fair." Adapted from Balke (34).

Two somewhat common and easily administered laboratory tests of pulmonary or respiratory function are apparently related to fitness and are almost certainly related to the functional capacity of the lungs. Serious lung disorders almost always cause a noticeable decrease in vital capacity.

Vital capacity is determined by having the subject take as deep a breath as possible and then, with his nostrils pinched closed, having him exhale maximally into an instrument called a *spirometer*, which records the volume of air expired. It is related to body size and should be divided by body weight or body surface to get standards, but an average figure for young men is about 4.6 liters and for young women about 3.1 liters. In emphysema, left heart disease, chronic asthma and bronchitis, carcinoma, tuberculosis, and fibrotic pleurisy, vital capacity (VC) can fall (as much as 70 percent); a decrease of even 20 percent should lead one to suspect some kind of pulmonary dysfunction.

The maximal breathing capacity test, which involves more elaborate equipment, is essentially a measure of the volume of air that can be "moved" or ventilated in a given time, usually 15 seconds. It is apparently more closely related to fitness than the less dynamic VC test. An average value for men is about 100–150 l/min but this rate cannot usually be maintained for more than 15 seconds because dizziness caused by a temporary alkalosis often occurs.

You have seen evidence that heart rate taken at rest and during a standardized exercise is reduced with training. It follows, then, that these measures of heart rate should in some way serve as an index of CR capacity. The "step test" is based on this principle, as are many other exercise and recovery heart rate tests. Of the simple tests that require little equipment, the heart rate recovery tests are apparently accepted as the best and most reliable means for evaluating CR capacity. Any means of standardizing work load will do, but stepping up and down appears to be the simplest and certainly involves the least expensive equipment. Although there *are* established tests and norms, such as for the Harvard Step Test and its modified forms (see Tables 8.3–8.5), it is well to teach each person to select his own specific "test procedure" so that he can use it at home if necessary. The following procedure is recommended for home testing.

1. Select a surface for alternately stepping up and down. The usual recommended height is 16–17 inches, but the exact height is not critical and could be lower, even down to 8 inches, for older persons or persons with conditions that limit their ability to step up. (Care should be taken that the surface is stable and will not easily tip over.)
2. Secure a metronome or a recording that will establish a rhythm of about 100–120 beats per minute (march tempo is satisfactory). This will allow you to standardize your *rate* of stepping. This is extremely important as you can see in Figure 8.33.
3. Secure a watch or clock with which you can easily begin and stop your

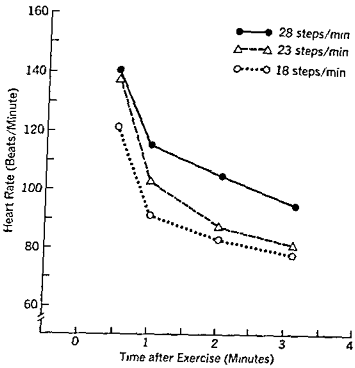



**FIGURE 8.32** Effect of varying rate of stepping on heart rate recovery. A 21 in. bench was used, the test was 2 minutes in length Source· Physiology of Exercise Laboratory, University of Toledo.

stepping time and count your pulse rate during recovery after exercise.

4. If at all possible, take the test after thirty minutes of complete relaxation, preferably in the lying position. Midmorning is best. Wide deviation in temperature and humidity from test to test can easily render your results unreliable.

5. Familiarize yourself with the rhythm and order of stepping. Use a rate of 120 beats per minute (100–120 acceptable), which means 30 complete up-down cycles per minute. That is, you step up on the bench (and down) thirty times each minute if you step with each beat —"left foot up, right foot up; left foot down, right foot down." You should rise to full leg extension each time (Figure 8.33).

6. Time yourself precisely and step for three minutes, or according to the following table.

| AGE | TIME* |
|---|---|
| Under 30 | 3 min |
| 30–45 | 2 min, if currently sedentary |
| 45 and over | 1 min, if currently sedentary and then only after physical examination |

*The time will, of course, be affected by the height of the bench. The lower the bench, the longer you can step without CR or leg muscle impairment.

7. Stop precisely when you are supposed to, sit down and quietly wait for fifteen seconds. During this time, locate your "pulse" at the carotid artery (see Figure 8.34). Do not press hard

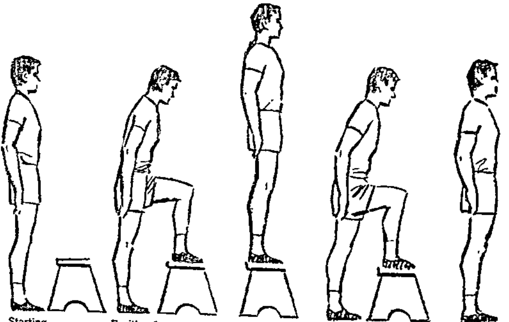



**FIGURE 8.33** Proper order of stepping for "step-test." You can begin with either foot, but the alternating pattern should be maintained as illustrated.

at this point, as pressure could cause a slowing of the heart rate.

8. Count your pulse for fifteen seconds and record the count.

9. Count pulse again 1 minute to 1:15 after exercise.

10. Count pulse again 2 minutes to 2:15 after exercise.

11. To check for reliability repeat this test again after several days, under exactly the same conditions.

12. Repeat at least twice a year under conditions that are as nearly the same as possible: Time of day, time and composition of last meal, temperature and humidity, emotional state, no immediately preceding exercise, and so on. Compare your test results through the years as an index of your CR capacity. *Report these comparisons to your physician if there has been a drastic change that you cannot logically explain.*

Of course, as the professional, you will want to use a standardized test for purposes of evaluating and recording circulo-respiratory capacity. The same principles outlined for "home testing" apply. Standardization is *most* important. What you intend to do with the results should affect the procedures. For example, if you simply wish to have students evaluate their own circulo-respiratory capacity, mass testing in

TABLE 8.3

| | | | |
|---|---|---|---|
| TEST: | Modified Step Test | | |
| BENCH. | 17" | | |
| RATE | 30 steps per minute (metronome = 120) | | |
| TIME: | *Men: 3 min*<br>Women· 2 min | | |
| PULSE COUNT: | From 1 00 to 1:30 post exercise | | |
| SCORING | Multiply count by 2. | | |
| *NORMS:* | | MALE | FEMALE |
| | *Poor* | *Above 125* | Above 135 |
| | *Avg.* | *111–124* | *121–134* |
| | Above Avg. | 100–110 | 110–120 |
| | Excellent | Below 100 | Below 110 |
| *AGE GROUP:* | *High school students, college students* | | |

pairs is acceptable, with each student having his partner count his pulse. However, if you wish to use the results to study the effectiveness of some particular training program, mass paired testing is out of the question; *you need highly standardized and reliable procedures with as few pulse counters as possible.*

Three modifications of the original Harvard Step Test· are presented in Tables 8.3, 8.4, and 8.5 as practical, *valid, and reliable procedures for your* professional use. The following precautions, if they can be observed, will serve to render your results more valid and reliable:

1. Standardize time of day test is given.
2. Do not use test after heavy meal.
3. Do not use test after physical activity.
4. Use only trained pulse rate counters if you wish results to be most reliable, valid, and objective.

Major Kenneth Cooper (M.D.) has developed what he calls the "12 Minute Field Test" (123) as a measure of CR capacity. It can be used for almost any

TABLE 8.4

| | |
|---|---|
| TEST: | Michael-Adams One Minute Step Test |
| BENCH. | 17" |
| RATE: | Men. 36 steps per minute<br>Women: 30 steps per minute |
| TIME· | One minute |
| PULSE COUNT: | *From 1.00 to 1:15 post exercise*<br>2.00 to 2.15 post exercise<br>3 00 to 3.15 post exercise |
| *SCORING·* | *Total of three counts multiplied by 4* |
| NORM | Average score for men and women is 300 |
| AGE GROUP: | High school students, college students and young adults in good physical condition |

SOURCE E. D Michael and A. Adams, "The Use of the One Minute Step Test to Estimate Exercise Fitness," *Ergonomics*, 7:211, 1964

TABLE 8.5

| | | | |
|---|---|---|---|
| TEST | Tecumseh Submaximal Exercise Test* | | |
| BENCH | 8" | | |
| RATE. | 24 steps per minute | | |
| TIME. | Three minutes | | |
| PULSE COUNT | Method A Time 10 heart beats beginning at 1 minute post exercise<br>Method B- Count heart beats for 15 seconds beginning at 1 minute post exercise | | |
| SCORING. | Method A $\frac{600}{x}$, where x = time (to nearest tenth of a second) for 10 heart beats<br>Method B. Multiply count by 4 | | |
| NORMS * | PERCENTILE | MALE | FEMALE |
| | 95th (Exc.) | 67 | 75 |
| | 75th (Ab Avg.) | 79 | 85 |
| | 50th (Avg.) | 90 | 95 |
| | 25th (Poor) | 100 | 110 |
| AGE GROUP | 10–69 unless in poor health | | |

*Approximation based on average of age groups 10–11, 12–13, 14–15, 16–17, 18–19, 20–29, 30–39, 40–49, 50–59, 60–69 Actual figures were no more different than 0–4 beats per minute except one case (Female 25th percentile) where difference was 8 beats per minute between 10–11 and 60–69 age groups

SOURCE. H. J Montoye, P. W Willis III, and D A. Cunningham, "Heart Rate Response to Submaximal Exercise Relation to Age and Sex," *J. of Gerontology*, 23 127, 1968.

person who has his physician's approval and certainly for youngsters in good health from ages 12 through college age. Table 8.6 gives the rating scale; the test is based on the distance one can cover in exactly twelve minutes.

TABLE 8.6 Rating Scale for 12-Minute Field Test

| IF YOU COVER | FITNESS CATEGORY |
|---|---|
| less than 1.0 mile | I Very Poor |
| 1.0–1.24 miles | II Poor |
| 1.25–1.49 miles | III Fair |
| 1.50–1.74 miles | IV Good |
| 1.75 or more | V Excellent |

## FACTORS OTHER THAN PHYSICAL ACTIVITY ASSOCIATED WITH HEART DISEASE

In addition to the facts and data concerning the relationship between circulo-respiratory integrity and exercise and training per se, there are conditions not at all or only indirectly related to exercise with which you should be acquainted. Many of these relationships have great meaning for programs in

physical education, health education, and recreation, and any good professional in these fields should have at least a basic familiarity with them if he is to operate effective programs based on the best foundation possible.

As you study the following pages, you will at once recognize most of the tie-ins with your profession. In most cases you will see how this information is an important part of your profession's foundational body of knowledge. Some facts are obviously more directly germane to one of the professions than to the others, but all are in some way a part of this important foundational framework.

### Obesity and Body Type

High blood pressure was 2.5 times more prevalent in Army officers who were overweight as in those not overweight (343). In the Framingham study, overweight individuals showed twice as many new cases of arteriosclerotic heart disease as those weighing less than average (146). However, Spain and co-workers (535) concluded that there is no association between weight and arteriosclerotic heart disease (AHD) when hypertension and diabetes are excluded. Nevertheless, those in the distinctly "below average" weight range have a significantly lower prevalence of arteriosclerotic heart disease. They found that endomesomorphic men (somewhat obese but mostly muscular builds) had a greater prevalence of arteriosclerotic heart disease than ectomorphs (thin build).

### The Nervous System and Emotions

In addition to the epidemiological data presented earlier there is some experimental evidence that lends credence to the theories that emphasize the role of emotional stress in the cardiac atherogenic process.

In experimental animals, cardiac ischemia and damage (381), as well as hemorrhages in the cardiac muscle itself (313), have been triggered by stimulation of discrete areas of the brain and sympathetic cardiac nerves. In both hyman beings and animals (32, 101, 193, 339, 472) stress, excess secretion of adrenalin and noradrenalin, and incidence of myocardial infarction have been linked together. Furthermore, there has been a report of a small but significant increase in the incidence of coronary occlusion in persons with duodenal ulcer (74).

Dr. S. G. Wolf (618) surveyed a small town in Pennsylvania in which the population is relatively obese. These native Americans of Italian descent eat at least as much fat as does the average American. Furthermore, serum cholesterol values are almost identical with those reported in other studies. Compared with neighboring communities, these people are gay, unpretentious, and even boisterous; there is no crime nor real poverty. The death rate from coronary heart disease is less than half that of neighboring towns and the rest of the United States. Dr. Wolf adds that it does not appear that genetic or ethnic factors are responsible for this lower rate, but that the "social pattern may be the relevant factor." Figures 8.35

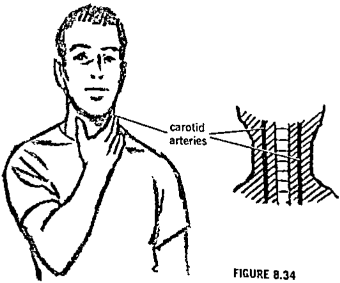



FIGURE 8.34

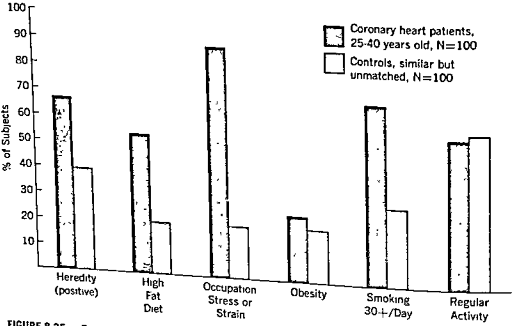



**FIGURE 8.35** Prevalence of various factors, supposedly related to coronary heart disease, in young CHD patients compared with non-CHD controls. Data from Russek and Zohman (484). Twenty-five percent had an extra job; 60 percent put in 60+ hours per week; 20 percent had unusual fear, discontent, frustration, and so on, associated with job.

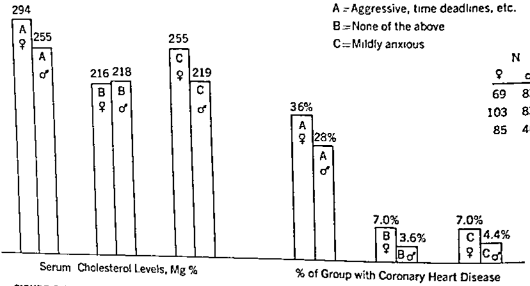



FIGURE 8.38 Personality type, serum cholesterol level, and incidence of coronary artery disease in men and women (age 30–60, all identified according to type before tests and diagnosis). Data from Friedman and Rosenman (194) and Rosenman and Friedman (477).

through 8.39 provide additional information regarding stress or anxiety and heart disease.

## Cigarette Smoking

Spain and Nathan (534), after an autopsy study of 3000 males, found 11.7 percent of the heavy smokers had arteriosclerotic heart disease whereas only 6.5 percent of the others had this disease. Your attention is also directed to Figures 8.35, 8.37, and 8.40.

## Blood Cholesterol and AHD

Gofman and others (213) and Gertler and others (208) report not only that high blood cholesterol is found in coronary patients but also that it and certain other lipid fractions of the blood are reasonably good predictors of AHD. Figures 8.38 and 8.41 are representative of many studies that show high serum cholesterol levels related to coronary artery disease.

## Genetics

A thorough discussion of heredity and a detailed presentation of evidence regarding inherited predisposition to atherosclerosis are beyond the scope of this text. We trust it will suffice to say that there is considerable evidence that genetic factors do play a role in atherogenesis. Two common and major clinical problems have been recognized: essential familial hyperlipidemia (elevation of fasting triglycerides) and essential familial hypercholesterolemia (elevation of total serum cholesterol).

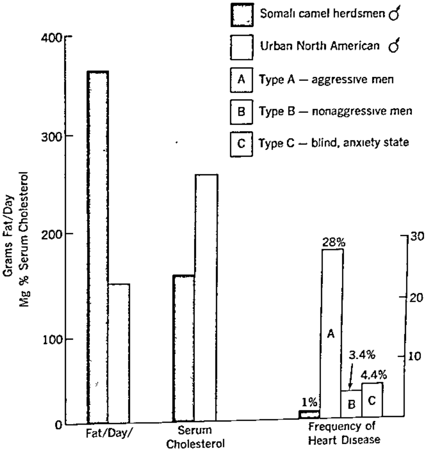



**FIGURE 8.39** Daily fat intake and serum cholesterol in Somali camel herdsmen and North American urban men. The herdsmen are said to be very physically active but lead a tranquil life; their urinary adrenalin secretion was uniformly low, indicating a less stressful life. Frequency of coronary heart disease in the Somali herdsmen as compared with three personality types of American men. Adapted from Lapiccirella (329) and Friedman and Rosenman (194)

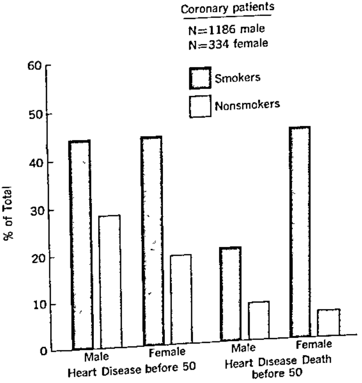



**FIGURE 8.40** Percentage of coronary patients developing heart disease before age 50 and percentage of those dying before age 50, smokers versus nonsmokers. Data from Sigler (517)

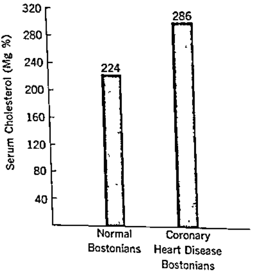



**FIGURE 8.41** Serum cholesterol levels in coronary heart disease patients. Data from Gertler and White (209).

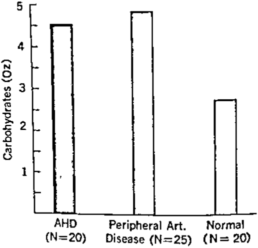



**FIGURE 8.42** Past sugar intake per day by normals, arteriosclerotic heart disease patients, and peripheral artery disease patients. Data from Yudkin (625).

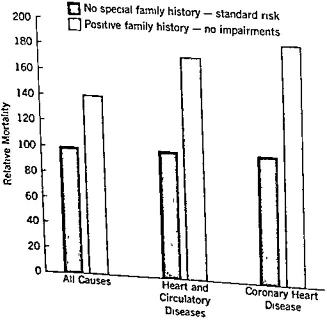



**FIGURE 8.43** Relative mortality among insured persons with family history of early CV-renal disease. Adapted from Katz, Stamler, and Pick (294) after Lew (344).

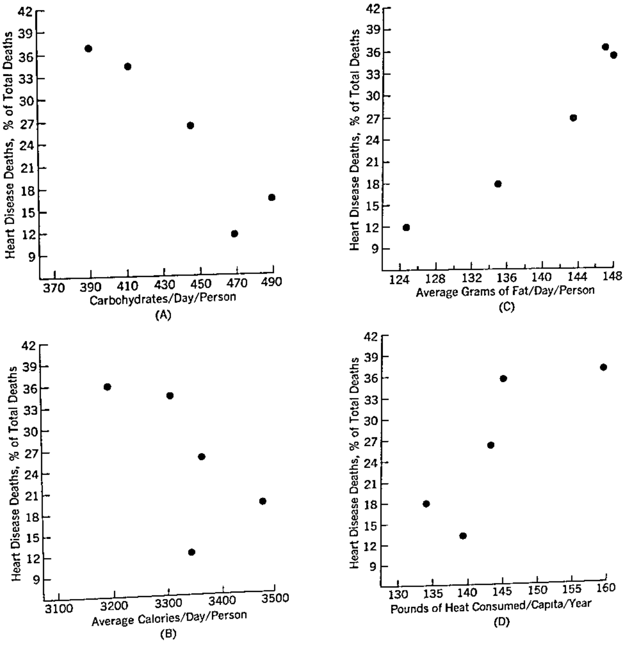



**FIGURE 8.44** Nutrition and percent heart disease deaths in the United States Each plotted point represents a given year 1920–1960 Adapted from *Statistical Abstract of the United States* (578).

Readers interested in a more thorough discussion of these factors are referred to Moses' text, *Atherosclerosis* (409).

Three representative and typical studies are depicted in Figures 8.35, 8.36, and 8.43.

TABLE 8.7 Rank Correlation Coefficients[a] between Various Dietary Components and Death Rates for 22 Countries—Males, Ages 55–59

| DIETARY COMPONENT | CORRELATED WITH DEATH RATE FOR ARTERIOSCLEROTIC AND DEGENERATIVE HEART DISEASE |
|---|---|
| Total calories | 0.723[c] |
| Calories from fat | 0.659[c] |
| Calories from animal fat[b] | 0.684[c] |
| Calories from vegetable fat[b] | −0.236 |
| Calories from protein | 0.709[b] |
| Calories from animal protein | 0.756[b] |
| Calories from vegetable protein | −0.430 |
| Calories from carbohydrate | 0.305 |
| Percent calories from fat | 0.587[c] |
| Percent calories from animal fat[b] | 0.677[c] |
| Percent calories from vegetable fat[b] | −0.468 |
| Percent calories from protein | 0.172 |
| Percent calories from animal protein | 0.643[c] |
| Percent calories from vegetable protein | −0.651[c] |
| Percent calories from carbohydrate | −0.562[c] |

[a]See pages 74–76
[b]Number of countries = 21
[c]Statistically significant (.02 level)
SOURCE Yerushalmy and Hilleboe (622) after Katz, Stamler, and Pick (294)

### Nutrition

Certain aspects of food intake have been linked with AHD by many investigators. A representative sampling of the most prominent correlations are presented in Figures 8.42 and 8.44 and in Table 8.7.

### Age, Sex, and Race

Figures 8.45 and 8.46 provide some insight into the age, sex, and race factors as related to AHD and stroke deaths.

### Summary of Factors Relating to AHD

Table 8.8 summarizes the various factors that have been experimentally or statistically linked with AHD.

## OTHER DISORDERS AND DISEASES OF CIRCULATION AND RESPIRATION

### Infectious Diseases

The following infectious diseases of the blood, heart, blood vessels, and

**FIGURE 8.45** Changes in CV-renal mortality rate in middle aged Americans, by sex and race, 1920–1955. Adapted from Katz, Stamler, and Pick (294) after Moriyama and Stamler (403).

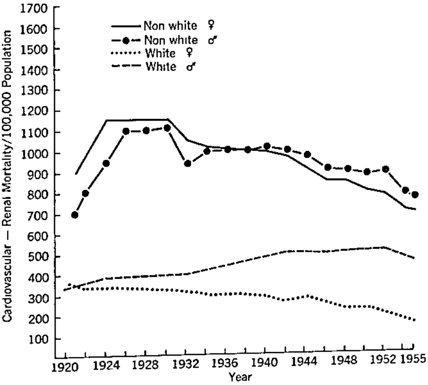
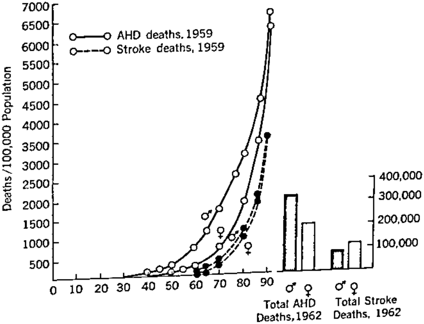



**FIGURE 8.46** Arteriosclerotic heart disease deaths and "stroke" deaths, related to age and sex. Data from *Facts on the Major Killing and Crippling Diseases in the United States Today* (172).



respiratory system are described in Appendix D.

bronchitis
chickenpox
common cold
diphtheria
heart valve infection
influenza
laryngitis
malaria
measles
measles, German
paratyphoid fever

TABLE 8 8 Factors That Appear To Predispose or Predict AHD

| FACTOR | EFFECT | REFERENCE |
|---|---|---|
| NOT CONTROLLABLE: | | |
| Heredity | Genes may predispose. Family history valuable in prediction. | (344) (484) |
| Age | Susceptibility increases with age. | (419) (172) |
| Sex | American white males more susceptible and earlier. Not true in all countries or all races. American Negro, no sex difference. | (419) (172) |
| Race | Negroes appear to be more susceptible. | (208) (403) (537) |
| Body type | Endomesomorph more susceptible | (535) |
| POSSIBLY NOT CONTROLLABLE | | |
| Cholesterol and triglyceride levels | Higher levels, especially above 275 mg% cholesterol, good predictors of AHD. Can be genetic. | (146) (209) (208) (213) |
| Hypertension | High blood pressure, especially diastolic score above 95, good predictor of AHD Can be genetic. | (208) |
| Uric acid level | High, fair prediction of AHD (8 mg% and above). | (208) |
| Exercise ECG | Ischemic ECG response to exercise good predictor of AHD | (369) |
| USUALLY CONTROLLABLE: | | |
| Diet | High fat diets and high percentage of fats in diet and high saturated fats may predispose, especially in the coronary-prone. Simple overeating may also be important factor. Sugar excess has also been implicated. | (228) (407) (308) (625) (484) |
| Stress and tension | May predispose, even predict AHD | (484) (194) (329) (618) |
| Physical activity | Lack of adequate physical activity may indirectly hasten onset of AHD | (600) (193) (477) (477) (235) (405) (406) (634) |
| Obesity | As degree of obesity increases, AHD risk increases in both men and women. Can be genetic. | (556) (491) (329) (146) (513) |

| | |
|---|---|
| parrot fever | "strep throat" |
| pneumonia | trench mouth |
| rheumatic fever | tuberculosis |
| Rocky Mountain spotted fever | typhoid fever |
| | typhus fever |
| scarlet fever | undulant fever |
| smallpox | whooping cough |

Sinusitis is an infection of the lining of the sinuses, the air spaces in the bones of the head and face. Infection may come from blowing the nose violently, from diving, or from swimming with the nose under water, which may force infectious material from the nose and throat into the sinuses. Allergies, enlarged adenoids, or other nasal obstructions may also cause sinusitis. Usually there is headache or pain in the cheek or the upper teeth or pain over the infected sinus in the morning, easing in late afternoon. The forehead may be tender to pressure. Often there is drainage of pus from the nose or a dripping from the back of the nose into the throat. The nasal passages may be dry and clogged because of the swollen membrane and lack of drainage. The sense of smell is sometimes partially lost and there may be fever, cough, swelling of the cheeks, eyelids, or forehead with general fatigue and aching.

Glandular fever, with enlarged lymph glands and spleen but no throat symptoms, is common in children. A similar infection in young adults is mononucleosis, with typical symptoms of fever, headache, fatigue, sore throat, and lymph gland swelling. There is an unusual "mononuclear" type of white blood cell present in the blood. During the acute fever, bed rest is prescribed and, unless there are complications, recovery with no apparent aftereffects occurs in several weeks.

Endocarditis is a bacterial infection of the inner layer of the heart muscle, and pericarditis is an inflammation of the thin sac surrounding the heart.

## THE IMPORTANT NONINFECTIOUS DISEASES

### Heart Disorders

MYOCARDIAL FAILURE (CONGESTIVE HEART FAILURE) When, for any reason, the heart is unable to pump out all the blood that returns to it, there is a backing up of blood in the veins that lead to the heart. The heart's failure to maintain good circulation may result in an accumulation of fluid in various parts of the body such as the abdomen, lungs, legs, and so on.

CONGENITAL HEART ABNORMALITIES There are now thirty-five known kinds of inborn heart defects, nearly twenty of which can be cured or improved by surgery. One signal that a newborn baby may have a heart defect is a blue tinge to the baby's skin called cyanosis. "Blue babies" have heart defects that prevent enough blood from getting to their lungs to pick up oxygen. An inborn defect may prevent a child from growing and gaining weight normally. He may tire easily or feel weak. There may be spells of breathing difficulty, with the child having to stop often to catch his breath. Heart murmur refers to abnormal or unusual sounds resulting from vibrations produced by the

motion of the blood within the heart. It is usually associated with valvular disorders.

Arrhythmia is a change in the rhythm of the heart that may be caused by physiological or psychological disturbances. The patient may not be aware of its existence for it can be detected only by careful physical examination. Some changes can be identified by observing the pulse rate or rhythm, whereas others require an ECG to be discovered and identified. Some "arrhythmia" is normal, especially during exertion, and a change in rhythm is not necessarily indicative of disorder.

Mr. S.'s story, as presented in an American Heart Association pamphlet, describes the course of a not uncommon heart disorder.

ANGINA PECTORIS It was a clear crisp morning late in the fall. The first white frost was on the ground. Mr. S. was a little late in finishing his breakfast and had to hurry to the station to catch the eight-fifteen train for town, where he had an important appointment in his law office. It was his fifty-second birthday and he had taken this half-mile walk nearly every weekday morning for the past ten years, in fact, ever since he had moved his family to their suburban home. He had never felt better than on this fine day, and the cold air was good to breathe as he hurried along.

Gradually he became aware of a slight sensation of tightness in the center of his chest, behind the breastbone. Later he described it as a sense of pressure, rather than actual pain. He wondered if he had gulped his breakfast too hurriedly, and was having indigestion. He was tempted to stop for a moment, but heard the train coming, so he continued walking. By the time he reached the station platform the pressure had increased, but it disappeared completely several minutes after he sat down. Then he felt as well as ever.

As he sat in the train, Mr. S. remembered that he had had the same kind of sensation in his chest a few times before. Each time it happened, he recalled, he had been exercising right after eating. He was sure that it was simple indigestion in each case. However, this morning's episode was the most uncomfortable one so far, and he decided to report it to his doctor if it happened again.

Several days later he was returning to his office after luncheon, feeling very well. As he walked up a slight incline leading to his office building, he felt the same sensation of pressure and tightness in his chest. This time there was also a very slight tingling along the inner side of his left upper arm. He was not particularly alarmed, but decided to stand still for a moment. A minute or two later the discomfort had vanished completely.

During the afternoon he mentioned casually to a business associate that he was "having a little indigestion after meals." This associate had several relatives and golfing partners who had angina pectoris, and he immediately suspected that Mr. S's "indigestion" might be angina. He persuaded him to consult his doctor that same evening.

Mr. S.'s physician examined him carefully and found nothing significantly wrong. His heart seemed to be normal and his blood pressure was perfect. The physician saw through the fluoroscope (a kind of x-ray machine) that Mr. S's heart had not changed in size or shape since the last examination. Even the elctrocardiogram showed no significant changes.

But the doctor's careful questioning convinced him that the pressure in Mr. S.'s

come narrowed by gradual development of atherosclerosis so that they cannot carry enough blood to the heart muscle, nearby arteries get wider and even open up tiny new branches to deliver blood to the area of muscle that needs it. This is called collateral circulation. (Other names for it are *compensatory circulation* and *substitute circulation.*)

Collateral circulation often develops while the main coronary arteries are becoming narrowed. This explains why many people who have narrowed arteries are not troubled with angina pectoris or with heart attacks. When for any reason this compensatory circulation does not develop properly or the atherosclerosis develops too fast, there is trouble in the form of heart disease.

Once a heart attack occurs, the development of collateral circulation may help the heart to mend itself. It is this collateral circulation that we hope for and which so often takes place in the course of some weeks or months after the first attack of angina pectoris.

The term *angina pectoris*, a name introduced by William Heberden of London in 1768, literally means "strangling in the chest." It remained for Edward Jenner (famous for his connection with smallpox vaccination) to point out several years later that angina pectoris and coronary artery disease were related.

It is important to understand that in almost all cases the diagnosis of angina rests entirely upon the history given by the patient—not upon changes that can be discovered by the doctor. Angina is a subjective symptom without objective changes to identify it. In this respect it is like a headache, which is usually not accompanied by any signs that would enable a doctor to recognize its presence. Although angina has so many characteristic features that the diagnosis can almost always be made easily, the patient may be asked to make more careful observations before the doctor can be absolutely certain.

Angina may be very mild or quite severe. It is almost always located in the very center of the chest, behind the breastbone, but it may extend from this area to either shoulder and into either arm. It may occur many times a day with slight effort, or only rarely in association with vigorous exercise. Sometimes it appears for the first time after recovery from a heart attack, and sometimes the first known heart attack occurs after many years of angina.

As a rule, the patient with angina lives a good many years after the first attack of angina, and he may die of some other disease or accident in old age. If the patient understands his condition, uses his medication intelligently, and is able to prevent situations that provoke anginal discomfort, he is usually able to lead an active life without discomfort. The development of an adequate collateral circulation may very likely improve his condition and permit a gradual increase in physical activities.

The cardinal rule for the patient is to prevent anginal discomfort. It is almost always possible to do this by avoiding certain kinds of effort and emotional excitement or by using the proper medicine before exposure to exercise or excitement. Sometimes it is wise or necessary for the patient to modify certain aspects of his life, but only occasionally is it necessary to eliminate normal activities.

It is very important for a person to consult his doctor as soon as possible after the appearance of any discomfort in the center of the chest. If it is angina, correct diagnosis and treatment at this stage may be very important to the patient's future health.[2]

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[2]This information has been reproduced by permission of the American Heart Association from the pamphlet "Heart Disease Caused by Coronary Atherosclerosis."

Extracts from a pamphlet published by The Public Affairs Committee, Inc., describe disorders of the blood and blood vessels.

## Disorders of the Blood and Blood Vessels

HYPERTENSION (HIGH BLOOD PRESSURE) Strictly speaking, hypertension is not a disease but a sign. It is like the headache or fever that may accompany a cold. High blood pressure is characterized by narrowing of the arterioles, through which the blood passes to feed the body tissues. The smaller the channel, the greater the pressure required to force the normal amount of blood through. So the heart works harder (not faster) and blood pressure rises. If the blood vessels are sturdy enough to withstand the extra pressure, their owner may be unaware of the trouble for years.

When high blood pressure cannot be attributed to any specific disorder of the body or mind, it is called *essential hypertension. Malignant hypertension* is a complication with more abrupt characteristics and with greater damage to the kidneys. It need not be considered hopeless, for treatment may bring improvement. Nor is it very common. Only 5 percent of 2147 patients studied at Columbia Presbyterian Medical Center had the malignant form.

Many people think that the higher the pressure, the greater the risk of damage. Science disagrees. The only important question is whether pressure is above normal, and what is normal depends on the person. Anyone who tries to forecast his future by comparing blood pressure readings at different times is wasting emotional energy —and probably boosting his pressure.

The danger in hypertension has been described by Dr. Page: "Persistent high blood pressure sets off a chain of events which cause hardening or scarring of the artery walls. These scars finally lead to closing of some of the vessels. As they close, the tissues become weak and are themselves changed to scar tissues which tend to check the blood flow."

*Atherosclerosis*, a form of hardening of the arteries, is a main cause of death among hypertensive patients. Cutting off the blood supply to vital tissues is as serious as depriving a plant of water. But not all sufferers from high blood pressure develop atherosclerosis, and among those who do there is variation in degree and intensity. Some patients are not affected for decades.

The three areas where the process is most serious are the heart, the brain, and the kidneys.

The heart will be temporarily or permanently damaged if one of its arteries is narrowed or closed. Clotting of blood within an artery of the heart is coronary thrombosis, commonly called a "heart attack." If the heart muscle is injured when blood flow is abruptly cut off, as in the case of a blocked artery, the result is myocardial infarction.

If brain vessels rupture or are blocked by a clot, the result is a stroke. Only a minority of patients succumb to strokes.

Reduction of the blood supply to the kidneys through hardening and narrowing of their arteries will scar the tissues and lower the kidneys' efficiency as a waste remover. If the damage is severe, poisons may pile up in the blood stream and produce uremia.

Some persons with high blood pressure have no symptoms whatever. Even when symptoms do exist, they are often not enough for diagnosis. You cannot determine, without consulting a physician, that your blood pressure is high.

A common symptom is headache. The headache may darken your outlook on life, further increasing your blood pressure Usually the physician can put an end to this symptom.

Dizziness and light-headedness may persuade you that you are about to faint (You

of the brain, that part will not function properly; this may cause weakness or numbness or loss of sensation or of movement in some part of the body. The decrease or loss of function depends on the extent of damage; the part of the body affected depends on the area of the brain involved, and is usually on the side of the body opposite to the affected side of the brain.

DISEASES OF BLOOD VESSELS OF THE BRAIN From birth to old age there are several things that can happen in the blood vessels of the brain to impair the working of the brain itself. A blood vessel may rupture or may become blocked, causing blood flow to the brain to be reduced or even stop. In all, there are four important ways in which this may occur. [See Figure 8.47]

There are a number of causes for the four different ways in which the circulation of blood to the brain may be disturbed.

These include defects of the vessels which may develop before birth, as well as physical injury, infections of the blood vessels, general infections, blood diseases, heart disease, hardening of the arteries, and high blood pressure.

Headaches, difficulties of vision, dizziness, fainting spells, numbness of hand or face, weakness, paralysis, difficulty in speaking, poor memory, difficulty in thinking, personality changes, and mental disturbances are among the common results of cerebral vascular disease. Nearly one sixth of all patients admitted to some mental hospitals have cerebral vascular disease. (On the other hand, most people with cerebral vascular disease may have no mental disorders.)

Any of the above symptoms, of course, may be caused by conditions other than cerebral vascular disease, and not all of them are always present in any one patient with cerebral vascular disease. The symptoms present depend upon the severity of

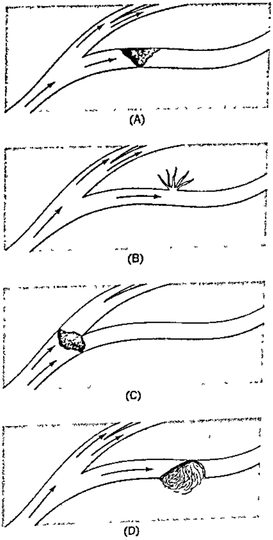


**FIGURE 8.47** Ways in which blood flow to a portion of the brain can be blocked (A) Blood clot forming in vessel (thrombosis), (B) rupture of vessel (hemorrhage), (C) a piece of a clot or other material from another part of circulatory system which circulates to the vessel (embolism), (D) pressure on a vessel caused by a tumor or swelling (A), (B), and (C) occurring in a coronary vessel can also cause "heart attack." Source: *Heart Terms* Public Health Service Publication No. 1073.

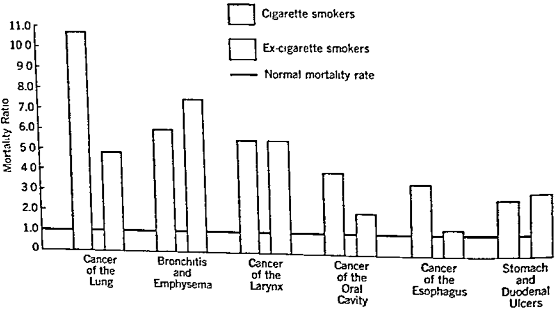


**FIGURE 8.48** The mortality ratio for various respiratory diseases and ulcer in smokers and non-smokers (comparison normal mortality rate). Data from *Smoking and Health*, Report of the Advisory Committee to the Surgeon General of the Public Health Service. Public Health Service Publication No 1103, pp. 102, 105.

fection, upward pressure on the diaphragm, dilatation of the alveoli of the lungs, disease of the tonsils, irritation of the skin, dyspeptic disorder, or nervous impulses.

The results of treatment are usually better in children than in adults, but it is a chronic disease and only a small percentage of asthmatic people outgrow asthma spontaneously. Unless treated, most of them will become worse. Prolonged treatment and proper supervision are usually necessary for severe, chronic asthma.

EMPHYSEMA Emphysema, which literally means "blown-up" or "over-filled" lungs, is most often a chronic disease and represents a state of distention of the alveoli of the lungs. Although overdistension might appear to be harmless, it results from disruption of the integrity of the alveoli, making them large and destroying their capillaries. Whereas the *total* lung volume is increased, the *effective* lung volume and vital capacity are decreased and the loss of pulmonary capillaries means a reduction in aeration of the blood. The person may even become cyanotic upon exertion, will almost always suffer from dyspnea, and heart action may be impaired.

This chronic disease is increasing and appears to be highly related to cigarette smoking (see Figure 8.48).

## Brief Summary of Other Noninfectious Circulo-Respiratory Disorders

ATHEROSCLEROSIS Yellowish accumulation of fatty plaques or deposits along the walls of the arteries leads to atherosclerosis (see Figure 8.49). Cells are destroyed by the fatty substances and a fibrous covering is formed. Eventually, the plaque calcifies and the artery hardens. The cells have lost their ability to dispose of fats in the diet, leading to a build-up in the artery lining. Other contributing factors apparently include high blood pressure, physical inactivity, cigarette smoking, obesity, diabetes, and heredity.

BUERGER'S DISEASE In Buerger's disease a thickening, chronic inflammation (possibly blood clots) in the vessels interfere with the blood supply of the region, usually the legs. This may result in swelling, ulceration, and gangrene. Allergy is suspected but it has been suggested that a major factor in its causation is the constriction of the blood vessels of the extremities due to

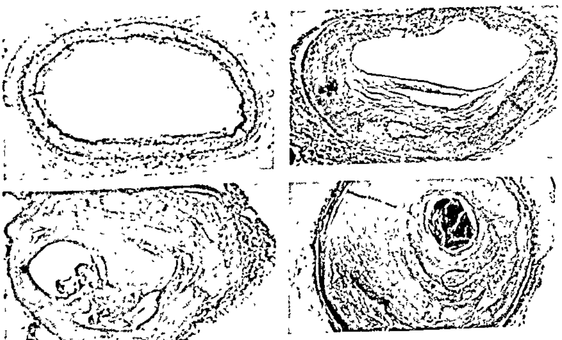

FIGURE 8.49 Illustration of the four stages of atherosclerosis, from a normal vessel to one so narrow that blood flow becomes so slow that coagulation occurs. This blockage, depending upon the site, can cause "heart attack," "stroke," and so on By permission, American Heart Association

the use of tobacco. Eighty percent of all cases are smokers.

CANCER The mouth, the esophagus, and the larynx are common sites for cancer in men and women (see Figure 8.48). It is highly associated with smoking. Symptoms are a sore in the mouth that does not heal, hoarseness or a persistent cough, and difficulty in swallowing. Cure rate is good if detected early and followed by prompt treatment.

EDEMA Abnormally large amounts of fluid are present in the intercellular tissue spaces of the body and give a bloated and swollen appearance. Edema may be localized or generalized, depending upon the cause.

HEMOPHILIA An inherited deficiency characterized by delayed clotting of the blood makes it difficult to check hemorrhage. Hemophilia is a sex-linked characteristic inherited by males through the mother.

HODGKIN'S DISEASE In Hodgkin's disease there is a painless and progressive enlargement of the lymph nodes and frequently of the spleen and liver. Fever, anemia, and general ill health are prominent in the later stages. The causes of the disease are unknown and the progression is fatal.

LEUKEMIA Sometimes called "cancer of the blood," leukemia is usually a fatal disease that affects the organs which make blood (lymph glands and bone marrow). In leukemia, the blood "composition gets out of control" and there is a tremendous overproduction of white cells that do not mature and are not able to fight infection. The number of red cells is reduced and the patient becomes anemic. The blood does not clot properly. Symptoms resemble those in anemia, with enlarged lymph glands and spleen. Recurring fever is likely to be present also.

PHLEBITIS The formation of a blood clot causes inflammation of a vein or phlebitis. It is often present in the leg. The abnormally large amounts of fluid in the intercellular spaces of the affected part are accompanied by stiffness and pain.

VARICOSE VEINS The cause of varicose veins is not definitely known, but any factor or combination of factors that brings about increased pressure within the vessels in the legs will most likely lead to a thinning and weakening of the walls of the veins and finally result in varicosities. These are veins that bulge and cause irregularity in the contour of the skin and are common in adults of all ages, sexes, and races. Persons with varicose veins usually complain that their legs feel tired and heavy. There may be a burning, stinging sensation with aches and cramps in the calves of the legs.

## SUMMARY

Degenerative disorders of the circulatory and respiratory systems are alarmingly prevalent in the U.S.A. today and are increasing.

Prolonged postprandial lipemia has been associated with coronary artery disease and heart attacks. (Exercise following a high fatty meal hastens lipid clearance, and lipid clearance is faster in the physically fit.)

## PRINCIPLES

1. The process of degeneration of the heart and arteries is a slow one and begins in many persons in the United States as early as the late teens.
2. To improve circulo-respiratory capacity, the heart and lungs must be taxed ("overload" principle).
3. To improve a specific circulo-respiratory capacity for a given task, that task or one very similar in demands must be involved in the training task (principle of "specificity").
4. All other factors being constant:
   a. The greater the proportion of total body musculature used, the greater the CR load.
   b. The greater the proportion of maximal force exerted by the muscles, the greater the CR load.
   c. The greater the frequency of contraction, the greater the CR load.
   d. The greater the intensity, the shorter is the time the load can be maintained and vice versa.
   e. Intensity and duration can be combined; thus there is an optimal load for a given duration.
   f. Optimal intensity and duration must be based on an individual's current health and physical fitness status and is best underestimated when in doubt.
   g. Exercise and/or recovery heart rates provide a simple and reliable index of exercise intensity.
   h. The threshold heart rate for CR improvement is apparently about 140 beats per minute or .60 (Maximum Exercise HR − Resting HR) + Resting HR; on the average this will be $.60\,(180-70)+70 = .60\,(110)+70 \approx 136$.
   i. The total length of time the threshold heart rate is maintained or exceeded will roughly determine the improvement in CR capacity up to a given point beyond which additional improvement will not occur unless the intensity is increased.
5. In keeping with the principles outlined above, there are many methods and combinations of methods which can, by application of these principles, produce CR capacity gains (for example, circuit training, interval training, certain sports, modern dance, any kind of "aerobic" activity).
6. When testing CR capacity, careful standardization of the work task, counting or measuring techniques, time of day, and so on, are of critical importance.
7. All other factors being constant, improved CR capacity is associated with improved work capacity and work efficiency, at least for the specific task involved, and possibly for other tasks which place similar demands on the CR system.
8. There is strong statistical evidence that, all other factors being equal, regular exercise prevents or postpones the onset of coronary artery disease or reduces the severity of such disease.

9. There is experimental evidence that regular CR loading can physiologically enlarge and strengthen the heart and provide for the opening up of pathways of collateral circulation in the heart muscle which has a restricted blood flow.

## EXPERIMENTS AND EXPERIENCES

1. Determine the extent to which the normal heart rate fluctuates during a twenty-four–hour period. At appropriate intervals, a thirty-second pulse count should be made and recorded. Hourly rates are best, and the activity engaged in at that time should be carefully noted. A plot of the data for the entire period will provide a comprehensive picture of the observed variation. What is the trend, if any, and how can it be accounted for?
2. Determine the relative circulo-respiratory value of various activities. Using an appropriate logbook or other recording system, a series of exercises, games, and so on, can be engaged in with pulse rates taken during special time-out periods. Needed will be a resting rate, a pre-exercise rate taken immediately before participation, a rate taken at the peak of activity, and a count at termination. Plotting such rates for each of the activities will provide a picture of the relative strenuousness of each of the activities. Compare with other individuals for the exact same activities, if possible. Are there differences? Does the relative strenuousness of the different activities vary from one individual to another? If so, how do you explain such a difference?
3. Determine the effects of "aerobic" training on CR capacity as measured by one of the tests described in this chapter, using yourself as a subject. Pretest, enter into the training program, retest every other week, and note the changes. Be sure to standardize all aspects of the testing.
4. Determine the heart rate after standing at attention for five minutes (remain in this position while the count is taken). Then begin walking slowly about; after several minutes of this slow walking, count the heart rate while continuing to walk. Compare your results and contrast with others' results. Which HR is lower? How do you explain the difference? Has the result any implications for the value of exercise?
5. Survey adults and high school students concerning their knowledge about the heart, what helps keep it healthy, what kinds of infections and disorders it can develop and the causes, relationship of heart disease to smoking, obesity, and so on. Develop a plan to correct the misconceptions you uncover and carry it out with the assistance of your instructor.
6. Survey the adults at a nearby YMCA, YWCA, or comparable recreation agency, and determine what knowledge they have of the relationships between physical activity and CR health, what constitutes "nonfitness" recreation as opposed to recreation which also provides CR benefits, and so on.
7. Determine the number of nearby recreation facilities which provide CR fitness activities, convenience of location, cost to users, and so on. Make a decision based on the facts as to the

adequacy of such community and private facilities. (It may be interesting to analyze summer and winter facilities separately.) Compare with opportunities for *non*active recreation such as listening to music, viewing films, and playing cards.

8. Study the heart rate increase caused by activities so as to isolate the effects of varying the percent of total body musculature, percent of maximal force exerted, rate of contraction, and length of exercise.

## SUGGESTED READINGS

The following references, which appear in the list beginning on page 689, are highly recommended: Bruner and Manelis (78); Burt and Jackson (84); Cantone (94); Chapman and Mitchell (99); Cooper (123); Eckstein (162); Heusner (245); McDonald and Fullerton (354); Morgan and Adamson (401); Morris and others (406); Nikkila and Konttinen (428); Sharkey (510); Zauner, Mapes, and Burt (629).

# Neuromuscular Function

# Chapter 9

## AFFERENT CONCEPTS

For years comic book advertisements have not only provided amateur and professional humorists with joke material but they have sold millions of dollars worth of "courses" on strength and muscle building. Could such a childishly simple appeal to the underdeveloped male's ego meet with this kind of success if the claims for these courses were entirely fraudulent? Considering the demonstrated gullibility of the American public this is, perhaps, a moot question. But in this particular case the promoters do not have to depend on claims that are completely false. There is enough truth apparent to the prospective customer to encourage him to give it a try. After all, who has not at least heard of someone in his circle of friends who has tremendously (even "fantastically") increased muscle girth and strength through some sort of "body-building" program? "If it can happen to him, why not to me?" is the logical query.

The fact is that, *under the proper circumstances*, practically anyone can substantially increase his strength and muscular

endurance. He can almost certainly also increase muscle girth and bulk. The only questions remaining are: by how much, under what conditions, and at what physical expense? These are all questions that any good physical educator should be able to answer with authoritative certainty. This is information he should be giving his students in a well-planned, systematic manner. And, more important, it is information that he himself should thoroughly *understand* from a scientific standpoint, based upon his knowledge of how the human being functions. Although this book is not intended to provide you with the extensive knowledge you will need about the function of human beings, a few basic concepts are presented as a means of introduction to some information you will need to acquire.

The human being would be utterly unable to function without the intimate interaction of three distinct systems: (1) the skeletal system, (2) the muscular system, and (3) the nervous system. Obviously these systems can be separated by dissection for minute study, but in terms of their actual function in human movement it is essential to realize that there is no simple way to separate their activities. Although the primary function of the nervous system is commonly defined as "communication" and that of the muscular system as "contraction," it should be readily apparent that one function without the other is essentially impossible. The interrelationship becomes evident when one recognizes that even quiet thinking cannot occur without certain minimal activity of muscles involved in the speech apparatus. And although we can readily identify two of the functions of the bones as protection and support, it must be recognized that muscles cannot produce tension unless they have something to pull against, and that movement in space cannot occur without the leverage provided by the long bones. Most of the discussion in this chapter centers about the function of the neuromuscular system with only minimal discussion of the role played by the bones in movement.

What can the human organism do? It is important to recognize that even the most noble thoughts of man cannot be recorded or expressed without movement of some kind. In other words, everything that man can do is dependent upon his ability to move in complex, purposeful ways. Painting a portrait, guiding a pencil, wielding a sledge hammer, walking a tightrope, playing the piano, transplanting a heart, striking a tennis ball, guiding a rocket, programming a computer, shoveling snow, and countless other tasks we generally take for granted are all dependent upon the effectively integrated action of the neuromuscular system. Furthermore, the remarkable efficiency we have come to expect of this dual system is due, in large measure, to the great adaptability inherent within it. Fostering understanding of the conditions under which such adaptation occurs most readily in desired directions is a primary task of physical educators and health educators.

The jobs of communication and decision-making within the human

organism are the responsibility of the nervous system. Decisions concerning whether to kick or kiss, to smile or smite are made after proper evaluation of all incoming stimuli. Instructions are then transmitted to the muscles for appropriate action. In order to understand adequately how important the proper functioning of this system is in our lives it is necessary to understand certain basic facts about it.

## THE NERVOUS SYSTEM

### Anatomy and General Function

The nervous system includes the brain, the spinal cord, and a network of threadlike nerves that spread out from these structures to every part of the body. Because of the great complexity of this system it has been necessary to consider it as being composed of separate segments, in order to make the discussion of its structure and function somewhat easier. Therefore, when we speak of the central nervous system (CNS) we are referring to the brain and the spinal cord, both of which are enclosed within bony structures (the skull and vertebral column). All the nerves and the ganglia (clusters of nerve cell bodies) outside these structures are grouped under the heading of the peripheral nervous system. Obviously these are not two separate systems, but rather two parts of the same system (see Color Plate 8 and Figure 9.1).

Certain functions of the body, such as walking or speaking, are under the conscious control of the will. Conversely, there are certain body functions over which we have little or no control at all. The portion of the nervous system responsible for the activity of the skeletal muscles, which enable us to move and speak, is called the **somatic** system. The **autonomic system**, on the other hand, controls the functions of the heart, intestines, urogenital tract, blood vessels, endocrine glands, and certain other portions of the body that are not under our conscious control.

Because the functions of these organs may need to fluctuate in either of two directions (either *increased* or *decreased* activity), it is not surprising to learn that there are two separate portions of the autonomic system that make this possible (see Figure 9.2). In general, the activity of one of these portions is antagonistic—or opposite—to the activity of the other. The **sympathetic** portion of the autonomic nervous system, for example, increases the rate and force with which the heart beats. The effect of the **parasympathetic** portion is to slow down the heart rate. Although the sympathetic system does not cause *every* organ or gland it serves to *increase* its activity (intestinal activity, for example, is *decreased* by increased sympathetic stimulation), it consistently opposes the activity of the parasympathetic system. It is the balance between the effects of these two systems that determines the actual level of activity of a particular organ of the body at any given time (see Chapter 12).

In general the sympathetic nervous system acts to prepare the body for responding to emergency situations. Thus, in times of danger the heart sud-

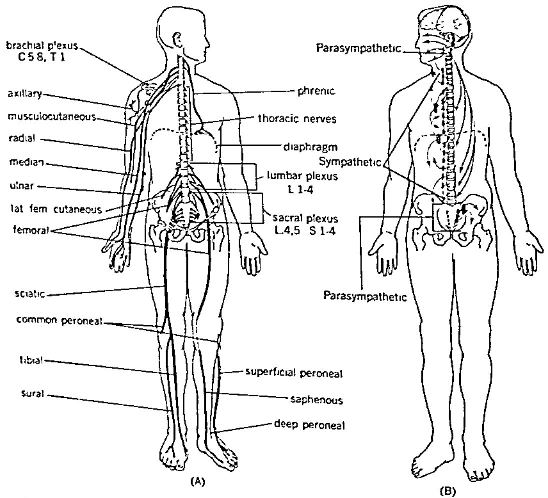


**FIGURE 9.1** (A) Distribution of the major nerves of the voluntary (somatic) nervous system. (B) Schematic diagram of the autonomic nervous system. Note the two divisions: sympathetic (or thoracolumbar) and parasympathetic (craniosacral). The sympathetic system passes through the ganglionic chain before going to its destination (shown here on only one side of the spine). Adapted by permission from B. G. King and M. J. Showers, *Human Anatomy and Physiology*. Philadelphia: W. B. Saunders Company, 1964, p. 68.

system to initiate and coordinate such activity. Such activation may be the result of a conscious wish of the individual or entirely of a reflex nature, or perhaps a combination of the two. Because little muscular activity can be accomplished without an increased blood supply to the muscles involved, it is important that the autonomic nervous system function properly to produce an increase in heart rate and in stroke volume, and alterations in the caliber of the blood vessels. Intelligent direction of the activities of the muscles is provided by the higher centers of the brain, usually the subcortical areas.

*All the various functions mentioned* above depend upon the ability of nerve cells, called neurons, to transmit im-

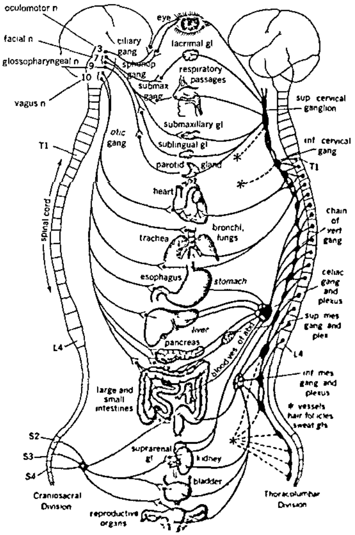


**FIGURE 9.2** Diagram of the autonomic nervous system. The parasympathetic (craniosacral) is on the left and the sympathetic (thoracolumbar) *on the right. Adapted* by permission from B. G. King and M. J. Showers, *Human Anatomy and Physiology*. Philadelphia. W. B. Saunders Company, 1964, p. 125

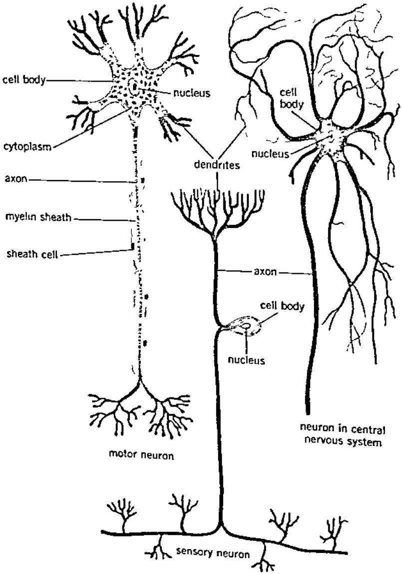


FIGURE 9.3 Three neurons of common types. The motor neuron at the left shows the myelin sheath formed from sheath cell membranes several layers thick around the axon. Many neurons are much longer, relative to the diameter of axon and cell body, and many have much thinner myelin sheaths. By permission from D. R. Griffin, *Animal Structure and Function*. New York: Holt, Rinehart and Winston, Inc., 1962, p. 100

pulses rapidly and in complex patterns from one part of the body to another. At this point it is important to recognize that the terms "nerve" and "neuron" are not synonymous. A **nerve** is made up of many neurons, whereas a neuron is a single nerve cell or fiber. Neurons may vary in length from just a fraction of an inch to nearly six feet (see Figure 9.3). Some of them carry impulses from sensory receptors (pain, heat, pressure, sight, smell, sound, and so on) to the central nervous system. Such nerve cells would be called **sensory neurons**. Because such fibers conduct impulses toward the CNS, they are also called **afferent neurons**. Those that carry impulses *from* the CNS to the muscles of the body are called **motor neurons** because they are responsible for producing movement. Since these carry impulses *away* from the CNS, they are often referred to as **efferent neurons**. The major "nerves" of the body include both sensory and motor neurons. A third major classification of neurons is collectively labeled **internuncial neurons** or, sometimes, central neurons. These fibers serve to make all the millions of connections necessary for coordination of the various levels of activity within the CNS. Such neurons are involved in integrating all the complex processes of thought, memory, learning, balance, sight, speech, movement, and other functions of the human organism. (Cells that serve to support the shape and structure of the nervous system but have no neural function are called glial cells.)

Although neurons vary considerably in length and diameter, as well as in the speed with which they conduct impulses, they are all essentially similar in basic structure and function. Neurons conduct impulses in much the same way that a fuse carries a spark; that is, the neuron itself supplies the energy for the propagation of the impulse. Because of this fact, each neuron conducts in an **all-or-none** manner. That is, either the neuron fires in a given situation or it does not. If a given stimulus is of sufficient strength to cause the neuron to fire, the application of a stronger stimulus would have no greater effect in so far as the intensity of the discharge is concerned.

If, on the other hand, a given stimulus is not strong enough to cause the neuron to fire, such a stimulus is said to be below the **threshold** of the neuron. When we refer to the threshold of a given neuron or sensory receptor, we are talking about the minimal level of stimulation that is sufficient to activate that neuron or sense organ.

The simplest example of how structures of the nervous system work together is demonstrated by the **spinal reflex arc**. When the physician taps your knee (the patellar tendon) with his small rubber hammer, you have observed the response that is elicited: the foot swings forward in a kicking motion. Figure 9.4 illustrates how the muscle spindles are stretched by this stimulus causing an impulse to be sent from the quadriceps muscle group to the spinal cord. When the impulse arrives at the spinal cord, it must cross the small gap that exists between the sensory (afferent) neuron and the motor (efferent) neuron. This junction be-

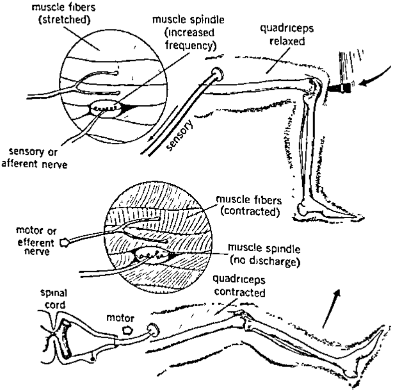


**FIGURE 9.4** Action of muscle spindles. Tapping of patellar tendon stretches relaxed quadriceps muscles. Spindles within the quadriceps respond to stretch by sending impulses to spinal cord. Reflex is completed when motor impulse is returned to the quadriceps, causing them to contract, thus removing stretch from spindles

tween the two neurons is called the synapse. Here at the synapse impulses are permitted to cross in one direction only: from afferent neurons to efferent neurons In our example the sensory neuron synapses directly with the motor neuron. (In most instances, whether they are reflex or higher order functions, there are one or more internuncial neurons interspersed between the sensory neuron and the motor neuron.) As soon as the motor neuron is stimulated by the impulse from the sensory neuron, it carries an impulse rapidly back to the quadriceps muscles causing them to contract suddenly. The result is the kicking motion which you observe.

The total time required for this reflex action (from the time the hammer strikes the knee until the leg begins its forward swing) is called reflex time. Reflex time is composed of the time it takes for the stimulus to travel over the

sensory neuron, cross the synapse in the spinal cord, and return to the muscle causing it to contract. It is known that the time for an impulse to traverse a *single* synapse between neurons is from .5 to 1.0 millisecond. This period of time constitutes the synaptic delay. By determining the actual synaptic delay in various reflexes it has been possible to estimate the number of synapses that are involved. Of course, the more neurons and synapses there are involved in a neural pathway the longer it will take for an impulse to pass over it.

A term that is very much like reflex time is reaction time (Figure 9.47). This can be defined as the time elapsed between the presentation of a stimulus and the initiation of the response. The important difference to be noted here is that the response called for may not be a simple reflex activity. One might be asked, for example, to push a certain button when a particular combination of lights flashes on, but *not* to push it whenever some other combination is lighted. Such a response requires a certain amount of judgment and as such would naturally be slower than a simple reflex.

In both of the previous cases it should be noted that time is measured only to the *beginning* of the movement. The time for the movement (from its instant of starting to its specified conclusion) is called movement time. If we are interested in the total time it takes for an individual to complete his response to a stimulus (called response time) we would simply add reaction time and movement time together.

## THE MUSCULAR SYSTEM

### Anatomy and General Function

If you are to teach about the muscular system and how it can be understood and efficiently used, there are certain basic characteristics of this type of tissue that must be recognized.

You are probably aware of the fact that skeletal muscle is only one of three kinds of muscle tissue in the body. This type of muscle, which is responsible for movement of the limbs and support of the body, is also called *striated* muscle because of its striped appearance when viewed under the microscope. Another term for this muscle is *voluntary* muscle, because it can be controlled by the will of the individual. This is not true for cardiac or smooth muscle, at least under ordinary circumstances (see Figure 9.5). A second kind of muscle is that found in the heart. It is similar in many ways to skeletal muscle, but does not bear the same kind of distinct striations. In addition, the small muscle fibers of skeletal muscle are more completely insulated from each other than are those of cardiac muscle.

The third kind of muscle tissue is called *smooth* muscle and is found in the walls of the digestive tract, the blood vessels, and certain other organs. Smooth muscle is much slower acting than striated muscle and is easily distinguished from the two other kinds of muscle.

Although the fibers of all three types of muscle tissue share the property of

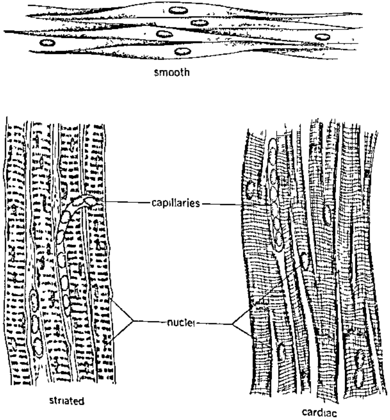


**FIGURE 9.5** The three types of muscle cells. Note capillary containing red blood cells located close to the muscle cells. By permission from D. R. Griffin, *Animal Structure and Function.* New York: Holt, Rinehart and Winston, Inc., 1962, p 60.

being able to shorten when stimulated, we are most interested here in how this is accomplished in skeletal (voluntary) muscle.

The exact mechanism by which muscle is able to contract is not yet understood. We do know, however, that the fibers of muscle tissue are made up of long chainlike molecules of protein. The two predominant proteins in these molecules are called *actin* and *myosin.* The research of several physiologists (notably A. F. Huxley and H. E. Huxley) has shown that these molecules of actin and myosin are arranged alternately in a pattern such as is shown in Figure 9.6. If you will look carefully at the diagram, you will see that the alternating light and dark bands of the fiber are made up of rodlike filaments that slide between one another. Where these filaments or rods overlap with one another, the bands appear dark. Where they do not overlap, there are light

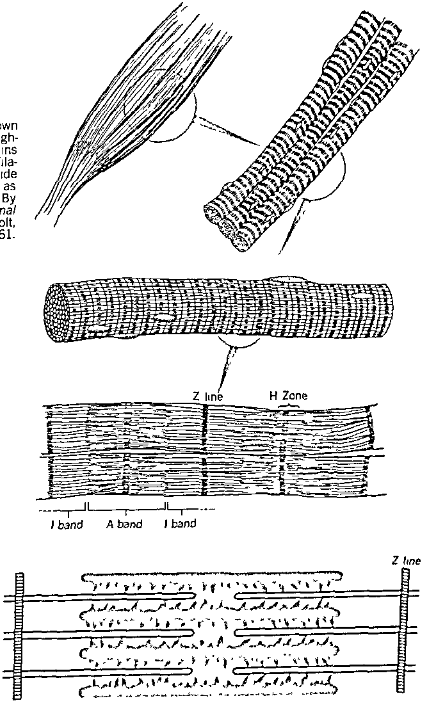


**FIGURE 9.6** Striated muscle shown diagrammatically at successively higher magnification. The A band contains most of the myosin, while the long filaments of actin are believed to slide past the thicker myosin filaments as the muscle contracts and relaxes. By permission from D. R. Griffin, *Animal Structure and Function.* New York: Holt, Rinehart and Winston, Inc., 1962, p. 61.

bands. The dark areas are called A-bands while the light areas are known as I-bands. The dark line in the center of the I-band is called a Z-line (and sometimes a Z-membrane). You will notice that the smaller filaments (composed of actin) are attached to the Z-line.

As the actin filaments are caused to slide between the larger myosin filaments in the A-band, the Z-lines are drawn closer together. Although it is not yet clear how the interaction between the actin and myosin filaments occurs, A. F. Huxley has presented interesting evidence (261) of a ratchet-like action involving minute cross-bridges between the filaments. By successively attaching, pulling, releasing, and reattaching themselves to receptor sites on the adjacent filament, these tiny cross-bridges are believed to cause the sliding movement that is ultimately responsible for all muscular contraction.

As Figure 9.6 shows, the tiny muscle filaments are grouped together to form single muscle fibers. These fibers, in turn, make up little bundles (called fasiculae) that, in turn, combine to form the familiar muscle bundle. These muscle bundles are combined in a number of different patterns and ultimately compose the 600 muscles of the human body. These muscles, together with the skeleton, provide a basic framework and determine the actual shape of the body and its various parts.

The various ways in which muscle fibers are combined in order to provide joint movement under a variety of conditions is interesting in itself. Figure 9.7 shows how some muscles are made up of fibers running parallel to one another, whereas others are made up of various combinations of diagonally pulling fibers that utilize a central tendon to deliver their force to the bones involved.

The functional organization of the muscles is of great importance. Whenever one of the tiny muscle fibers is stimulated by the neuron (nerve fiber) that innervates it, it shortens to its maximum capacity. This is true of all muscle fibers. That is, when they are stimulated they either contract maximally or not at all because the stimulus delivered by the neurons is always of the same magnitude or intensity in the normal individual. The term used to describe the phenomenon is the *all-*

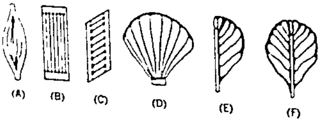


**FIGURE 9.7** Example of different arrangements of fibers within muscles: (A) fusiform or spindle; (B) rectangular or parallel, (C) rhomboidal; (D) triangular, (E) penniform, (F) bipenniform. Adapted from D. F. Wells, *Kinesiology*. Philadelphia: W. B. Saunders Company, 1961.

*or-none law*. You must keep in mind at this point that we are discussing individual muscle fibers only, not the entire muscle.

If you were somehow able to examine the organizational structure of the muscles of the body, you would discover that the fibers are arranged in "squads" or scattered groups, with each squad of fibers served by a single nerve fiber (Figure 9.8). Whenever an individual nerve fiber "fires," all of the muscle fibers to which it is connected will contract in an all-or-none manner. One such neuron or nerve fiber may serve as few as 3 muscle fibers or as many as 2000 (177), depending on the size and function of the muscle in which it is located. Muscles engaged in movements requiring extremely fine adjustments, such as those that control the movements of the eye, have a much lower ratio of neurons to muscle fibers than do muscles involved in more gross movements, such as jumping and running. This would mean, of course, that the calf muscle might have one motor neuron for every 800 muscle fibers, whereas the muscles controlling the fingers might have only one neuron for every 50 fibers. The term commonly used in discussing neuromuscular organization of this type is motor unit, defined as a single motor neuron together with all the muscle fibers it innervates.

Each muscle, then, is composed of a number of motor units, all of which act as independent elements in the sense that they "fire" in a random, "unsynchronized" way whenever they

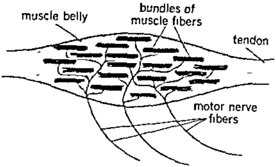


**FIGURE 9.8** *A schematic diagram of the arrangement of the muscle fibers into "squads" or motor units. By permission from A. C. Guyton, Function of the Human Body.* Philadelphia. W. B. Saunders Company, 1969, p. 69

are activated. (Perhaps it would be more accurate to say that the separate units operate in harmony with one another, much like the separate instruments of a symphony orchestra. They operate independently, but the overall result is a smooth, harmonious "orchestration.") It should be easy to see that if only a few motor units were firing at any given time, the force being exerted by the muscle would be relatively slight. In order to increase this force it is a simple matter to bring in or "recruit" more motor units to participate in the task.

It should be made clear here that there is a very distinct hierarchy among the motor units. That is, some motor units "fire" in performance of the most simple movements, whereas others are never utilized until the task attempted requires maximal exertion. The former group of units would be referred to as having a *low threshold*, whereas the latter would be called *high-threshold* motor units. Thus the low-threshold

units would be involved constantly throughout virtually *all* movements, but the units of very high threshold would become activated only on the rare occasions when maximal force is required. Between these two extremes there are, of course, motor units that range in threshold from low through moderate to high. The significant factor is that these units always come into play at about the same tension level each time they fire. As this tension is maintained or increased in the muscle, they would continue to fire, and then, as tension is decreased, they would drop out of activity at about the same level at which they had entered (see Figure 9.9).

One theoretical way of increasing strength would be to involve somehow the normally inactive motor units of very high threshold in lower-level activities in which they would ordinarily not be involved.

INCREASED FREQUENCY OF MOTOR UNIT FIRING It has been pointed out that in addition to muscle hypertrophy, maximal strength can be increased by means of "permanent" recruitment of motor units of very high threshold. Another change that can produce an increase in the force muscles are able to exert is the increase in the *frequency* of motor unit firing. It has already been mentioned that motor units fire asynchronously, that is, out of phase with one another. This asynchrony of motor unit activity ensures smoothness of movement. It is easy to see that if all

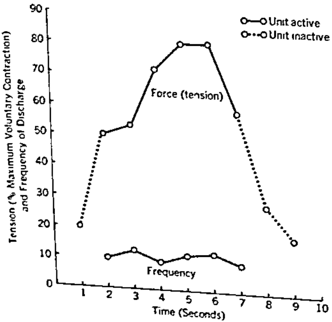


**FIGURE 9.9** Plot of a single motor unit coming into action at 50% tension and continuing to fire (at 13 cycles/second) until tension again drops to about 58%. Adapted from B. Bigland and O. C. J. Lippold, "Motor Unit Activity in the Voluntary Contraction of Human Muscle," *Journal of Physiology*, 125:322, 1954.

motor units fired simultaneously, the result would be a sudden, jerky movement of great force. For most purposes this would be an inappropriate action. Picture what would happen every time you tried to lift a pencil or a glass of water if muscles responded in this fashion!

The synchrony of motor unit function is directly related to the frequency with which the individual motor units fire. It should be realized that motor units are capable of altering the rate at which they fire, and that this change in frequency is directly related to the amount of force exerted at any given time. Consider, for example, a group of motor units, with each unit firing in an unsynchronized manner with respect to the other units, at a rate of 5 cycles per second. This means that the separate fibers of each unit are all contracting 5 times each second, but that very few of the fibers of the total muscle are contracting simultaneously. Now, if the rate of firing of the motor units is suddenly increased to 50 cycles per second, it should be clear that it is much more probable that some of these muscle fibers will be contracting simultaneously with others. Since more muscle fibers are contracting at any given instant when the frequency rate is high than when it is low, it is obvious that more force is being exerted by the muscle involved when frequency of firing is high.

CHANGE IN AMOUNT OF CENTRAL INHIBITION AND FACILITATION One of the most fascinating aspects of the study of human strength deals with the many reports of "superhuman" performances of people who are involved in emergencies. An example of such reports appeared in the press a few years ago. As the story was reported, a young man was working under his car, which he raised by means of an automobile jack. Suddenly the jack slipped and the man was pinned beneath the car. The father, who was nearby, rushed to his aid and feverishly began attempting to reposition the jack. The victim's mother (who suffered from arthritis) ran to the car, grasped the bumper, and lifted the car off her son. The effort caused a compression fracture of one of her vertebrae, but she *had* mustered enough strength to lift the car from her son!

How is it possible to explain such extraordinary feats? Obviously there is no long-term training effect involved; yet there is undeniably an increase in the measurable strength levels. Perhaps you are now in a position to attempt a partial explanation, at least, on the basis of your knowledge of motor unit recruitment and frequency of firing. In this connection it is interesting to note that it has been estimated that if all the muscle fibers of the body could be induced to contract at one time a force in excess of six tons would be exerted. This would certainly be more than the human frame could withstand and would result in the total ruin of the organism. Apparently there are built-in mechanisms that prevent such massive simultaneous contractions.

These same mechanisms are continually active in preventing damage in more ordinary circumstances. Although some are of a reflexive nature and are

activated by the tension within a muscle or a tendon, others originate in the higher brain centers. Such stimuli have been called inhibitors; the process, central inhibition. These terms imply that people are capable of much greater performance than they are ordinarily able to demonstrate, simply because their activity is inhibited by impulses from the brain. If it were somehow possible to reduce or release these inhibitors, remarkably greater performance in terms of strength or muscular endurance would be expected. In extremely stressful situations where great excitement or anxiety prevails it is believed that such a release takes place. This, in turn, could lead to greater synchrony or to decreased motor unit thresholds or to both, which could explain unusual displays of strength or muscular endurance.

Another neurological process that affects the degree to which muscular contraction can occur is facilitation, a positive process by which impulses that cause contraction are sent from the central nervous system (chiefly the brain) to the motor neurons. In such situations, more activity than normal may result because many "protective" inhibitory impulses are overridden. Although it is difficult, if not impossible, to determine whether unusual strength is due to facilitation or to decreased inhibition, it seems safe to assume that *both* processes are involved.

It has been demonstrated a number of times that "cortical inhibition," or inhibition originating in the cerebral cortex, can serve to hinder performance drastically. If a person as a child has always been cautioned not to overdo, or has been continually warned about the dangers of injury involved in physical performance, he may well develop serious limitations in his physical capacities. Fear of social criticism, especially true of women, has very real consequences in terms of ability to excel in activities requiring strength. Hypnotism has been used in a number of interesting ways to attempt to "disinhibit" people. Dr. Arthur Steinhaus has reported the case of a girl who was able to increase her strength by more than 50 percent while in a hypnotic trance (543, p. 142). Once this breakthrough was achieved, she was able to continue to perform at this level even in the waking state. It was later discovered that the girl had always been cautioned not to overdo because of a childhood asthmatic condition. In addition, earlier teasing about being unusually athletic (despite her genuine femininity) had created a socially induced inhibitory state.

Other studies concerning the effects of hypnotism have attempted to determine the psychological limits on performance. Although reports are somewhat contradictory, it appears that the strength and endurance of highly trained athletes cannot be greatly increased by hypnotism. (Hypnotic suggestion can dramatically *decrease* performance, however.) Among nonathletes, on the other hand, it appears that hypnotism can produce an increase in muscular performance, particularly in respect to strength (110, p. 53). See Chapter 13 for further discussion of this topic and results of some studies.

## Identifying Muscles

In learning to identify specific muscles it is helpful to know how muscles have been named. Basically there are four ways in which names have been applied: shape or appearance (the trapezius is shaped like a trapezoid), location (subclavius is located below the clavicle), bones connected (the intercostals are attached between the ribs), and their action (the supinator supinates the hand, that is, turns it palm upward). Some muscles, of course, do not appear to fall into any of these classifications.

## Identifying Movements

In any discussion of human movement it is necessary to be acquainted with the names of the muscles involved but also to know the terms used to identify the specific movements involved. In Table 9.1 is a list of common terms with their definitions. Figure 9.10 identifies some of the frequently discussed movements.

# CONTRIBUTIONS TO PHYSICAL ACTIVITY

## The Nervous System

From the preceding discussion it can be seen that the nervous system is the key to all body movement, including exercise. It is involved not only in initiating, coordinating, and directing activity but also is largely responsible for producing the necessary adjustments in body functions to make the exercise possible. Plate 2 and Figure 9.1 show

**TABLE 9.1 Definition of Terms Commonly Used in Describing Movement**

| TERM | DEFINITION |
|---|---|
| **Agonist** | Any given muscle that is responsible for the action under consideration Example: Biceps brachii, causing elbow flexion. |
| **Antagonist** | Muscles so located that they can oppose the action of the agonist. Example· Triceps brachii, causing elbow extension |
| **Fixator** | Any muscle that performs the act of "locking" a part firmly in place, thereby giving other muscles a firm base from which to work |
| **Prime mover** | A muscle or group that is primarily responsible for a given joint action It may be responsible for more than one action, and two or more muscles may be prime movers for a single action |
| **Synergist** | A muscle, other than the prime mover, that acts to aid, support, and guide the action caused by the prime mover |

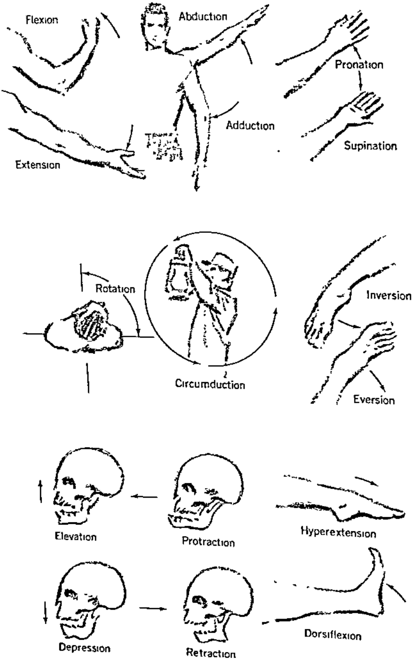


**FIGURE 9.10** Types of joint movements. Adapted from Franz Frohse, *Atlas of Human Anatomy*. New York: Barnes & Noble, Inc., 1961.

some of the major divisions of the central nervous system that are intimately associated with activities essential to physical activity. The cerebrum is the part of the brain concerned with all conscious functions. Sensations, voluntary movements, memory of skills, judgment of distances, appropriate force of movements, and many other of the "highest" levels of activity are centered here.

The thalamus appears to be an important relay center for almost all complex reflex movements and the perception of sensations. The hypothalamus is responsible for the coordination of such autonomic functions as the control of body temperature by sweating, vasoconstriction (narrowing of the blood vessels), vasodilation (dilation of blood vessels), shivering, and so on.

The coordination of skilled movements, making them smooth and effective, is a function of the cerebellum. Through its action on the skeletal muscles, this part of the brain makes it possible for us to maintain equilibrium.

The increase in the rate and depth of breathing as well as the elevation of the heart rate and blood pressure during exercise are brought about through the activation of reflex centers contained in the portion of the brain called the medulla oblongata.

Extending upward through the brainstem, the medulla and the pons is a complex network of nerve cells, called the *reticular activating system.* This area serves the extremely important function of sending alerting messages throughout the brain whenever stimuli from the sensory system are received.

## The Muscular System

The contribution of the muscular system to exercise is obvious. Without muscle function there would be no exercise because movement of any kind would be impossible. Of course, the muscular system has important functions in addition to the primary one of providing movement. It is also responsible for producing most of the body heat and for maintaining upright posture. The last function is technically one of stabilizing body position rather than causing movement.

SETTING LIMITS It is apparent that the functional ability of the muscular system is not an "either/or" proposition. That is, we do not think in terms of either having strength or of not having strength. The same is true of endurance, power, and flexibility. Instead, we usually think in terms of *how much* (or how little) of these factors we possess. Indeed, the *degree* to which neuromuscular function has been developed is frequently the deciding factor in whether one succeeds or fails in a given activity. In other words, each of us is *limited* in what he can accomplish by the degree to which the neuromuscular system has become developed. It is for this reason that the great adaptability of the neuromuscular system is of such importance. Unlike certain other limitations imposed upon us, the neuromuscular limits are, to a large extent, under our own control. Once this is understood, decisions concerning one's optimal level of neuromuscular development can be made and activity

programs designed to achieve the desired goals.

In discussing the limitations imposed upon us by the neuromuscular system we will need to consider not only strength but also muscular endurance, power, coordination, and flexibility. In addition, we will give consideration to some of the basic mechanics of human movement.

### The Skeletal System

Although this chapter is basically devoted to the ways in which the nervous and muscular systems work together to produce movement, it is impossible to discuss human motion without an occasional reference to the skeleton.

In everyday activity the skeletal system can be said to have at least five important functions. First of all, it provides protection to vital organs of the body, the brain, the heart, the lungs, the spinal cord, and so on. In addition, it supports the body in much the same way that steel girders give support to modern buildings. It provides a system of levers upon which the muscles can act to produce locomotion and other movements. A fourth service performed by the skeleton is to store calcium needed by other body systems for proper function. And finally, the long and flat bones of the body provide the important manufacturing process of blood cells, both red and white, as well as the blood platelets that are essential for clotting.

Color Plates 5 and 6 show most of the major bones of the body. From time to time you may wish to refer to these illustrations as various movements are discussed. In addition, it is suggested that you familiarize yourself with the terms and definitions at the end of this chapter. You will find this information helpful in the discussion to follow. Although more detailed explanation of how these systems do their jobs will be presented later, we are presently interested in discussing some of the observable outcomes of neuromuscular teamwork.

## EFFERENT CONCEPTS

### STRENGTH

The ability of the muscles to exert force is called *strength*. It is obvious that some people are stronger than others. If we wish to find out how much stronger one person is than another, we must then measure *maximal strength*. This can be determined by measuring the greatest amount of force each person can exert for a brief instant. Under this definition it is apparent that the measurement of total body strength is very difficult, if not impossible. Because it is possible for someone to have a very strong grip despite having weak legs, it is obvious that strength is a factor specific to individual muscles, and that the strength of one muscle group is not necessarily related to the strength of another group.

Another interesting fact about strength is that there are different "kinds" of strength. The ability to

lift a heavy suitcase to an overhead rack would be an example of dynamic strength. In this illustration, several muscles are involved in a series of smooth, continuous contractions. These contractions are called **isotonic** because even though the length of the muscle changes, the tension within the muscles remains essentially the same (*iso = same; tonic = tension*).

As an example of static strength consider what happens when you attempt to pull a croquet stake out of the ground after it has been securely pounded into hard soil. In this case, your muscles attempt to shorten, but the resistance is so unyielding that no movement actually occurs. This expression of static strength results from **isometric** contraction of the muscles involved (*iso = same; metric = length*).

Up to this point we have discussed two types of muscle contraction: isotonic and isometric. Although most muscular activity can be described fairly adequately by these two terms, it should be recognized that there needs to be some elaboration of the term "isotonic." As you have learned, "isotonic" means a change in length of the muscle. Ordinarily we think of this change only in terms of a *shortening* of the fibers. That is, if you were to take a drink of coffee you could pick up a cup from the table and, by shortening the biceps muscle, bend your elbow in raising the cup to your lips. This would certainly fall into the category of isotonic contraction. But what about putting the cup back down on the table? Obviously you cannot simply let go and allow it to fall. Normally, you would carefully, and somewhat slowly, lower the cup and set it down gently.

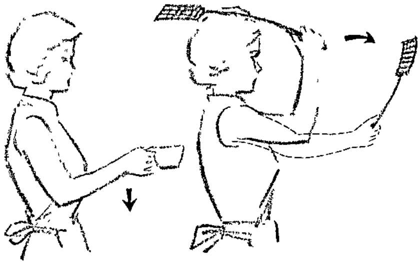

**FIGURE 9.11** Lowering a cup gently illustrates eccentric contraction of the elbow flexors (biceps) whereas swatting a fly illustrates vigorous elbow extension utilizing concentric contraction of the triceps.

Because the event has involved movement it must be isotonic,[1] but does it involve a shortening of the musculature involved? Obviously it does not. As a matter of fact, quite the opposite is the case. The biceps muscle is actually involved in a process exactly opposite to its activity in raising the cup. Now, instead of bending the elbow against the force of gravity, it *gradually allows* the elbow to be extended by the force of gravity. Note that in this situation, as shown in Figure 9.11, the triceps is not needed to extend the elbow, because, if the biceps were not contracting, gravity alone would be sufficient to extend the elbow. The muscle, instead of shortening to perform the task, actually *lengthens* slowly until the cup rests firmly on the table. This lengthening of muscle fibers to do work is called eccentric contraction.

It should be easy to see that approximately half of the work done in most lifting movements involves eccentric contraction of muscles.

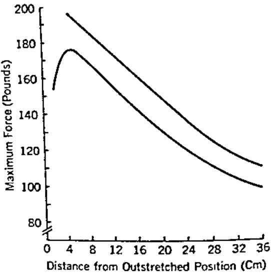


**FIGURE 9.12** Maximum isometric force (top) compared with maximum isotonic force (bottom). In this test of elbow flexion strength, position is indicated in units of distance from the completely outstretched position. Adapted from E. Asmussen, O. Hansen, and O. Lammert, "The Relation between Isometric and Dynamic Muscle Strength in Man," *Communications*, Danish National Association for Infantile Paralysis, Hellerup, Denmark, 196 , p. 8.

On this basis, then, we could talk about static strength as being the greatest force a given muscle group could exert with no movement involved. By dynamic strength we would mean the force required to move the greatest resistance possible through the complete range of strength. We would discover that for any given muscle group (the biceps, for example) static strength is somewhat greater than dynamic strength (see Figure 9.12). This can be seen in the fact that a light object can be lifted quite rapidly, but if one attempts to lift heavier and heavier objects, his movements become slower and slower. Finally, the object may not be moved at all, despite the efforts of the lifter. At this point, however, he is exerting greater force than at any previous time, assuming, of course, that all other factors, such as motivation, effort, and fatigue level, remain constant.

[1] Dr. Alfred Hubbard (257) has suggested that the terms "miometric," "pliometric," and "isometric" be used to indicate shortening contraction, lengthening contraction, and no change in muscle length during contraction, respectively. Although these terms appear to cover the possibilities much more simply than does the traditional terminology, they have not yet achieved widespread acceptance.

## MUSCULAR ENDURANCE

In addition to those already mentioned there is another factor closely related to strength, and, as a matter of fact, often confused with strength. The term used to describe this phenomenon is muscular endurance. Essentially, muscular endurance is the ability to persist in any given muscular activity in which *local* fatigue rather than general exhaustion becomes the limiting factor. The number of push-ups or chin-ups you can perform is a measure of muscular endurance (assuming, of course, that you are able to do more than one of these). In these exercises it is obvious that you do not stop because of a general breathlessness or respiratory distress. The musculature in a certain area becomes uncomfortable and seemingly is unable to contract further, so activity ceases. In this respect, muscular endurance should not be confused with circulo-respiratory endurance, which will be discussed later.

The fact that tests such as chin-ups or push-ups have frequently been used as tests of *strength* rather than *muscular endurance* has introduced some confusion into this topic. It should be remembered, however, that if more than one repetition of movement such as a push-up or a chin-up can be performed, this is a test of muscular endurance, *not* maximal dynamic strength.

Just as there are two types of strength, there are also two types of muscular endurance. These should be fairly obvious to you now that you have studied the section on strength. Dynamic (or isotonic) endurance involves the number of repetitions of a given isotonic contraction that can be performed. Static (or isometric) endurance involves the amount of *time* a contraction of a given magnitude can be held. It will not surprise you to learn that generally the greater the force exerted initially by an individual, the less will be his "holding time."

The body seems to compensate automatically when we become aware that a maximal exertion over a period of time is required. As Figure 9.13 shows, four strong young men were asked to exert maximal force against a strain gauge. After establishing that such a measurement was repeatable, they were asked to pull *just as hard* but to hold the pull for as long as possible. In every case the greatest force exerted under these conditions was considerably less than was observed under the original conditions.

## MUSCULAR POWER

Another term sometimes confused with strength is "power." With respect to human performance, power refers to the degree of "explosiveness" with which force is applied. It is quite possible for a man to have very strong legs, strong enough, in fact, to enable him to life great weights on his shoulders. This same man, however, may not be able to jump straight into the air for more than five or six inches. On the other hand, another person of similar weight and build but with less strength may be able to jump vertically more than thirty inches. The difference lies in the ability

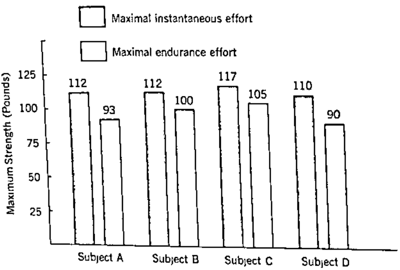


**FIGURE 9.13** Comparison of performance when subjects were asked to exert the greatest force possible (maximal instantaneous force) with the same condition except that they were told to *hold* their maximum as long as possible (maximal endurance effort). Unpublished data, Physiology of Exercise Laboratory, University of Toledo, 1963.

to exert the available force (supplied by the muscles and called strength) over as short a period of *time* as possible. Thus, power is made up of three factors: force, time, and the distance over which the force is applied. Mathematically this can be expressed as a formula:

$$\text{Power} = \frac{\text{Force} \times \text{Distance}}{\text{Time}}$$

Assuming the distance through which the force acts remains constant, it should be possible to increase power by either increasing the ability to exert force or *decreasing* the time period over which the force is acting. Both are reasonable approaches and both can be used to improve performance requiring power.

The importance of power in most athletic activities should be obvious. The quick jump-turns required in skiing, the "firing out" of the blocker in football, the rapid leg movement required in the hundred-yard dash, the swing of the golf club, the snap of the badminton racket, the upward thrust of the leaping dancer are only a few illustrations of how power is a requisite for even mediocre performance in many activities.

## IMPORTANCE OF ADEQUATE NEUROMUSCULAR CAPACITY

The question of how much strength, muscular endurance, and power are needed by any given individual can be answered only on a personal basis. It is obvious that the professional football player needs more of these attributes than the office secretary does. On the other hand, to assume that some

soon. They are not designed to test all areas of the body but only to evaluate grossly those factors Dr. Kraus has found to be associated with low back pain.

## FLEXIBILITY

Any consideration of the factors that limit human physical performance must include some discussion of flexibility. In simple terms, flexibility is the degree to which a joint is free to move throughout its "normal" range of motion. Consistent with this definition is the fact that flexibility is a highly specific quality; full range of motion in one joint is no indication of the status of other joints of the body (338).

FIGURE 9.14 An example of emergency conditions requiring fitness. This woman and six others escaped from a burning building by means of a rope suspended more than 100 feet above the street. Twelve others perished in the fire that swept a six-story building in Kawasaki near Tokyo. (Wide World Photos)

It is obvious that a significant lack of flexibility could impair physical performance, whether of an athletic nature or simply that involved in routine daily activity. Complaints of chronic or acute lack of flexibility are more often brought to the attention of the physical educator than almost any other. Regardless of whether such conditions are because of a lack of physical activity or created (directly or indirectly) by trauma or injury, it is essential that the physical educator have a thorough understanding of joint structure and function. He must also be intimately acquainted with approved remedial and preventive exercises and techniques because he will be called upon frequently to work closely with medical personnel in cases involving flexibility problems.

The seven types of joints found in the body are illustrated in Figure 9.15. Although it is beyond the scope of this discussion to outline all of the common abnormalities associated with these joints, some of the factors contributing to the limitations of joint flexibility will be discussed.

### Injured or Diseased Joint Surfaces

Many kinds of crippling arthritis may lead eventually to actual fusing of the joints so that there is no longer a possibility of any movement in the afflicted

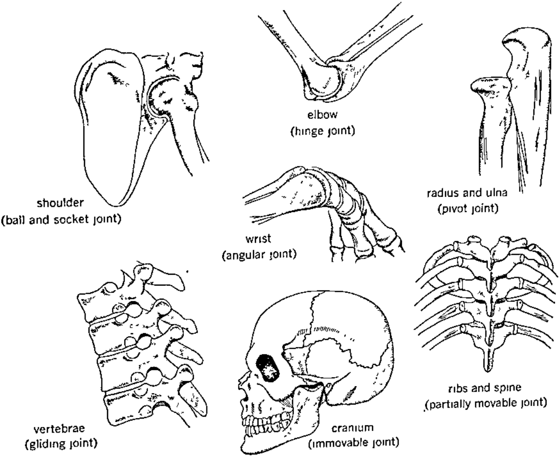


**FIGURE 9.15** The seven types of joints found in the body. Source. J. H. Otto, C. J. Julian, and J. E Tether, *Modern Health*. New York: Holt, Rinehart and Winston, Inc, 1963, p 254.

areas. Of course, there are many less severe forms of joint disease, but all are painful and all restrict movement to some extent.

## Calcification

Closely related to arthritic problems is the calcification of joints, which can result from a number of causes. It is quite common for individuals involved in activities that place great strain on joints to develop calcium deposits within joints that seriously restrict movement.

## Pain

One of the biggest problems in dealing with joint diseases or injuries is how to eliminate or relieve the pain invariably associated with them. In many cases joint movement is actually possible but the pain of movement is so great that the afflicted individual refuses to make

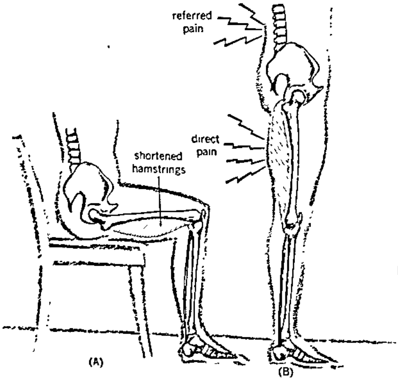


**FIGURE 9.16** Contracture ("permanent" shortening) of the hamstring muscles as a result of sedentary occupation.

the attempt. The result of this perpetual disuse is, of course, a gradual worsening of the condition until there is no longer any possibility of movement.

### Shortened Muscles and Tendons

Many of us may be fortunate enough to avoid the debilitating effects of arthritis or joint injuries, but we may develop a shortening of certain muscle groups because of faulty postures that are habitually assumed. One of the most familiar illustrations of muscle contracture resulting from faulty day-to-day postures and stances is the shortening of the hamstrings group (see Figure 9.16). These muscles, which are located on the back of the thigh, are responsible for bending the knee and extending the hip. These are the ones that complain whenever you attempt to place the palms of your hands on the floor without bending your knees. In most instances this difficulty arises because of the muscle-tendon adjustments that result from long periods of sitting. The knees are flexed at a 90° angle much of the day, allowing the muscles attached to the back of the knee joint to become permanently shorter than they should be. Then, when you attempt to bend

over with the knees straight, or when you attempt to kick one foot high into the air you suddenly, and sometimes painfully, discover that you have lost a certain amount of flexibility.

### Damaged Ligaments

Another cause of decreased flexibility is torn or damaged ligaments, which are tough bands of connective tissue that hold the joints together. These bands connect bone to bone (tendons connect muscle to bone) and are non-elastic. Very frequently, because of trauma of some kind, these ligaments may become stretched, torn, or pulled from their attachments. When this happens the joint becomes painful, of course, and perhaps cannot be used at all. As healing takes place the pain will subside, but frequently permanent injury results unless proper medical care has been given. Permanent joint looseness and even a tendency to chronic dislocation may result from such an injury. Frequently a piece of cartilage may "float around" in the joint, occasionally lodging between the articulating surfaces and causing the joint to lock. In almost all such cases surgery can prevent or correct serious problems, but the sooner such corrective surgery is performed the better are the chances for complete return to normal function (see Chapter 17).

### Muscle-Boundness

All of us have heard the term "muscle-bound" and most of us have a pretty good idea of what is meant by it. The assumption is that if an individual has bulging muscles he must have sacrificed some degree of flexibility. The truth of the matter is that, with intelligent training methods, normal flexibility will not only be unaffected but may even be increased (see Figure 9.17). The principle

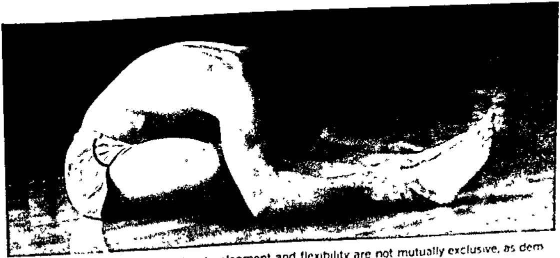

**FIGURE 9.17** Extreme muscular development and flexibility are not mutually exclusive, as demonstrated by a professional football linebacker and former "Mr. Toledo."

involved here is that both the agonist and the antagonist must receive equal attention in any overload training program.

It should now be clear that if one wishes to strengthen a particular muscle group, but also wishes to avoid a loss in flexibility he should give just as much attention to the development of the antagonists as to that of the agonists. This type of "balanced" training has produced a number of outstanding performers in many different sports, such as gymnastics, swimming, and other activities that require high levels of flexibility as well as great strength.

## BODY MECHANICS

In addition to the factors already mentioned, there are several others that affect the efficiency of the human organism. One such factor is that of body mechanics. In one sense, an individual's body mechanics are dependent on his levels of strength, endurance, and flexibility. It is equally true, however, that adequate development of these characteristics, to say nothing of their proper application in effective performance, is greatly dependent on how these factors are "strung together" and utilized.

It is very clear, for example, that a man who lifts incorrectly may seriously injure his back even though he may be an extremely well-conditioned person. It is also possible (although not nearly so clear-cut) that habitually poor postural habits may produce permanent structural damage, regardless of the relative strength of muscles.

### Posture

There is considerably less emphasis on the study of human posture today than at times in the past. Perhaps part of the reason for this is that experts in this field have been unable to agree on the importance of posture to the health of the individual. Arguments can be advanced supporting both sides of this issue and research studies have also been somewhat contradictory (42, 460).

It has become apparent to most people that because we are all individuals with different characteristics, there can be no such thing as an ideal posture for all. As a matter of fact, we are less interested in the somewhat artificial positions assumed by people who are being examined for postural deviations than we are in their normal, spontaneous ways of carrying themselves as they go about their daily routines.

Whether or not a slouching sort of stance can be said to predispose an individual to organic disorders that may seriously impair his health is questionable. There are certainly cases on record of individuals who have developed extensive structural abnormalities because of faulty habits of sitting and standing, but these are extremes. Many other people are apparently able to slouch through a lifetime with no organic difficulties. These puzzling discrepancies can be at least partially explained on the basis of the mechanical principles involved in human movement.

Basically, the human body is a group of levers suspended from a central post. These levers are operated by the

muscles through a wonderfully complex system of communication, all of which must operate according to certain precise physical laws. In this sense, the human body is indeed a machine, very little different from other complex machines. (One fundamental difference here is that whereas the manmade machine tends to wear out with hard use, the human machine becomes more efficient with use.) It should be evident that any activity of a machine, human or otherwise, that violates fundamental mechanical principles is bound to suffer in terms of efficient function. It is with this idea in mind that human movement and stance are studied today.

## Static Stance

The position in which you find your body as you read these words is an example of static stance. It is one of the positions normally assumed by most of us in pursuing our daily activities. Other examples of static stance can be easily observed in any one who is quietly sitting or standing, regardless of the circumstances involved. From a standpoint of mechanics it is possible to evaluate whether or not any laws are being violated and thereby to predict, to a limited extent, some of the difficulties that might be expected to occur.

If, for example, you are in the habit of reading with your book lying flat on the table and your head bent over the desk, the laws of equilibrium and stability would indicate that since the center of gravity of that heavy object (your head) is not directly over the supporting spinal column, an excessive strain must be placed on the muscles at the back of the neck in order to prevent the head from dropping all the way forward to the chest. Ordinarily, a static muscular strain of this kind persisting for any length of time would be expected to generate within the musculature involved a distinctly painful sensation. Such pain would certainly cause the reader to discontinue his activity in order to stretch and massage the neck in an attempt to alleviate the distress of these muscles. Under such conditions it is doubtful that any one would be able to continue long with study or reading of any kind.

Of course, the solution to this problem is relatively simple. Probably the best approach would be to purchase a book stand that would hold the book in a more nearly vertical position, thereby allowing the head to be held erect as the eyes focus on the printing. Some people may prefer simply to prop their heads on their hands in order to take the strain off the neck muscles, and this is certainly mechanically sound. It does, however, have the disadvantage of permitting only very shallow breathing and may position the eyes at an inefficient distance from the page. Both conditions, as well as certain others that could be considered, may interfere with the efficiency of the student in this very important activity.

A great many other illustrations could be cited, but they would all have essentially the same characteristics. The basic principle involved in an analysis of static stance is that of keeping the body segments balanced as well as possible over the bony supporting

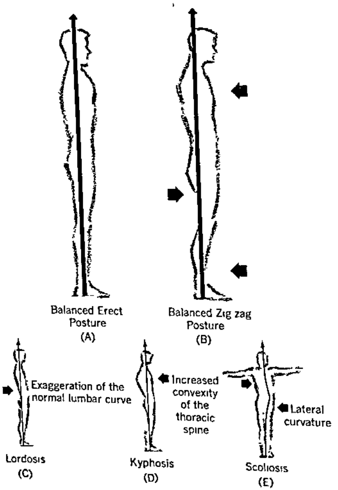


**FIGURE 9.18** Balanced posture is not necessarily erect posture: (A) no observable faults; (B) slouch with forward head, (C) lordosis; (D) kyphosis, (E) scoliosis.

structures of the body so that no undue "guy-wire" efforts are required of the muscles. It should be recognized that whenever one body segment deviates from a position directly over its point of support, compensation must occur elsewhere in the body in order to prevent the whole body from becoming unbalanced in that direction. In other words, for every "zig" there must be a "zag." As indicated in Figure 9.18, an individual may be able to maintain perfectly adequate balance among body parts even though one or more of them may initially be out of alignment, but in doing so a certain price must be paid—usually in terms of loss of an esthetically pleasing upright carriage.

## Dynamic Stance

So far we have restricted our discussion to static stance. Dynamic stance is certainly of equal or even greater im-

portance in terms of body efficiency because most people spend the majority of their waking hours in tasks that require such movements as bending, reaching, walking, sitting down, and getting up. The balance of body parts over their respective bases of support is just as important during movement as it is in static situations. Frequently the stance of individuals reflects things other than merely muscle weakness or other orthopedic difficulties. As a matter of fact, these more basic considerations—poor vision, lack of confidence, extreme shyness, and so on—may actually lead to permanent orthopedic problems. Any of these characteristics might result in a habitual stance, such as walking with the head down and the eyes looking at the ground.

## Deviations

Some of the common deviations from normal body structure that result from muscle weakness and/or faulty habits of sitting, standing, reading, viewing TV, and studying involve, among other things, exaggerated spinal curvatures.

Of course the normal spinal column has certain curvatures that are supposed to be there. These normal curves serve a number of practical functions, one of which is to cushion the brain from the shocks generated by walking, running, and jumping. If the spinal column were constructed without any curvatures, the head would be sitting on top of a rather rigid pillar of bones very much as a building sits on top of its solid foundation blocks. Because, however, the spine does curve, and since, in addition, there is a compressible cushion between each of its "blocks," the head actually rests on top of a very efficient shock absorber. In this fashion the delicate brain is protected from jarring forces that would otherwise be disastrous.

As shown in Figure 9.18, all the normal curvatures are in a single plane: that is, they run forward and backward only and not from side to side. Between the head and shoulders is the cervical curve. In the shoulder area is the thoracic or dorsal curve; below that, in the hollow of the back, is the lumbar curve. The sacral curvature is formed by the fused bones, on the back part of the pelvis, which are collectively called the sacrum.

An exaggerated humping of the thoracic curve, usually accompanied by round shoulders and a head carried forward of the central axis of the body, is called kyphosis (Figure 9.18D). Another condition, sometimes associated with kyphosis because of the "zig-zag" principle just discussed is lordosis (Figure 9.18C). In this condition, there is an excessive hollowness of the lumbar area resulting in a swaybacked appearance. This is one of the most frequently observed spinal deviations and one that is often implicated in the cause of low back pain, as has been pointed out previously.

A third spinal deviation frequently observed is one called scoliosis (Figure 9.18E). This lateral curvature of the spinal column from left to right, or vice versa, may be present in a single direction in the form of a C curve or it may appear as an S curvature.

The important thing to realize is that spinal curvatures and other orthopedic abnormalities may start out as merely functional deviations. This means that with a change in position the deviation can be corrected or removed. If, however, such deviations are not recognized and the habitual stances responsible for them are not removed, they may become structural. This means that the bony structure has actually become permanently modified to accommodate to the habitual position.

Although pride in appearance is sufficient to induce most of us to attempt to stand tall and to walk with a semblance of erect carriage, many of us become careless in the stances we assume while absorbed in our daily tasks. If these unconscious habits become bad enough they may result in our developing conditions unattractive to others and debilitating to ourselves.

## Principles Governing Body Mechanics

The efficiency of any activity or performance (including maintenance of static or dynamic posture) depends upon adherence to certain principles (physical laws) of mechanics. Although understanding such principles is obviously not necessary for efficient performance, it is nevertheless true that performance will never reach its maximal effectiveness unless it is actually in harmony with such principles. At the same time, any teacher or coach who has a sound knowledge of such basic principles also has a distinct advantage in correcting errors in performance or in devising new techniques.

Considerable study and experience are needed before one can expect to

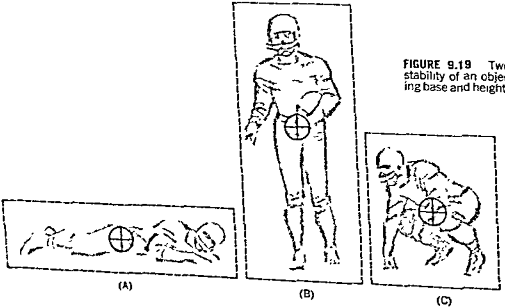


**FIGURE 9.19** Two factors affecting stability of an object: area of supporting base and height of center of gravity.

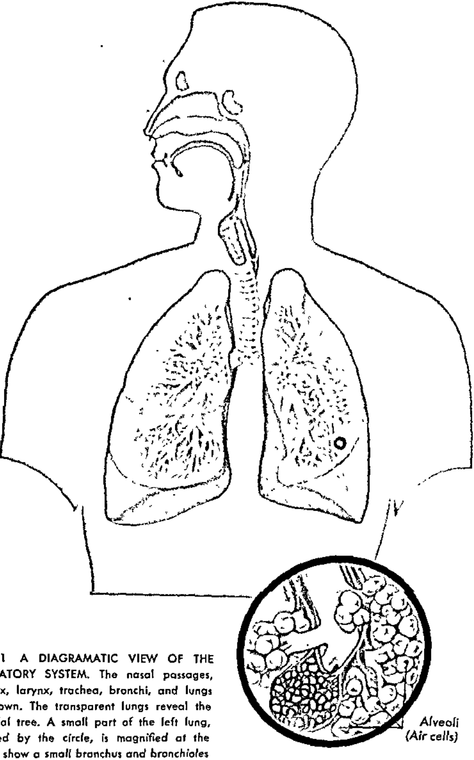


Plate 1 A DIAGRAMATIC VIEW OF THE RESPIRATORY SYSTEM. The nasal passages, pharynx, larynx, trachea, bronchi, and lungs are shown. The transparent lungs reveal the bronchial tree. A small part of the left lung, indicated by the circle, is magnified at the right to show a small bronchus and bronchioles *ending in alveoli, surrounded by a capillary net between a pulmonary artery and vein.*

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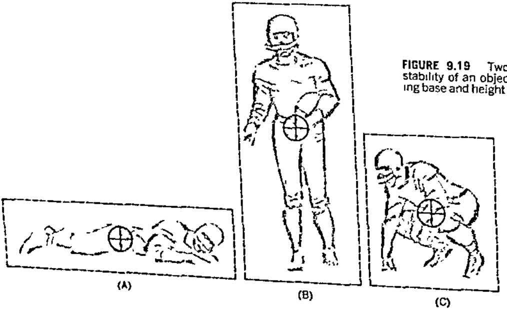


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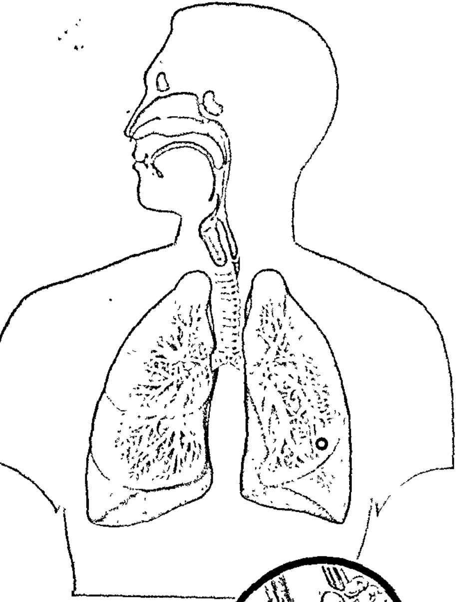

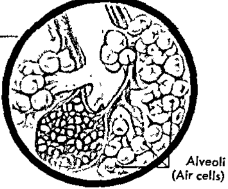


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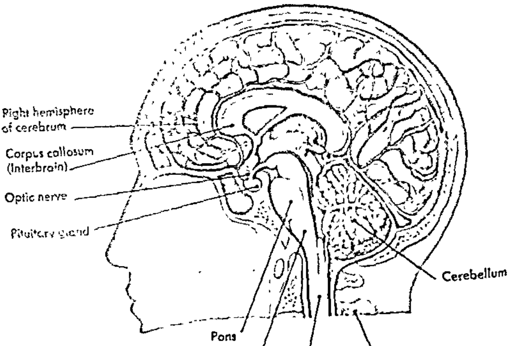
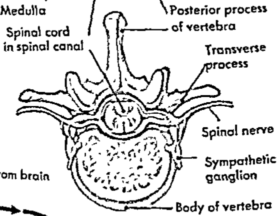
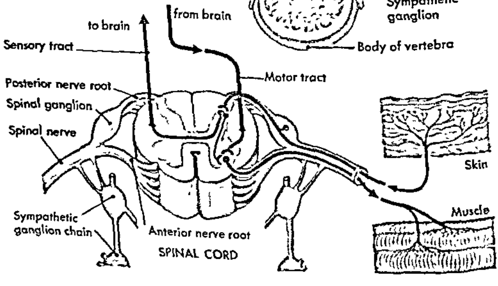



Plate 2 THE BRAIN AND SPINAL CORD. The figure above shows the right cerebral hemisphere and lower brain structures in mid-line section. At the right is a single vertebra seen from above. Note the sectioned spinal cord with its membranes and the spinal nerves. The figure below shows the path of a spinal reflex, involving a sensory neuron (blue), central or connecting neuron (black), and motor neuron (red). The sensory and motor tracts to and from the brain are shown.



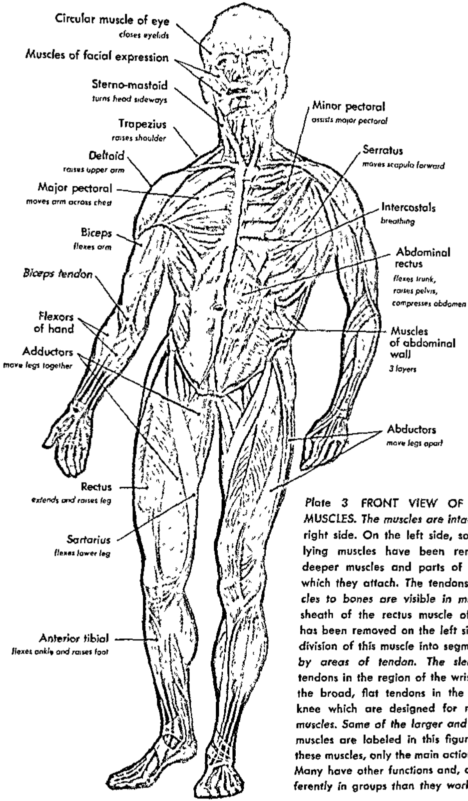



Plate 3 FRONT VIEW OF THE SKELETAL MUSCLES. *The muscles are intact on the figure's* right side. On the left side, some of the overlying muscles have been removed to show deeper muscles and parts of the skeleton to which they attach. *The tendons attaching muscles to bones are visible in many areas. The* sheath of the rectus muscle of the abdomen has been removed on the left side to show the *division of this muscle into segments connected by areas of tendon. The slender cablelike* tendons in the region of the wrist contrast with the broad, flat tendons in the region of the knee which are designed for more powerful *muscles. Some of the larger and more familiar* muscles are labeled in this figure. In labeling these muscles, only the main action is described. Many have other functions and, also, work differently in groups than they work singly.

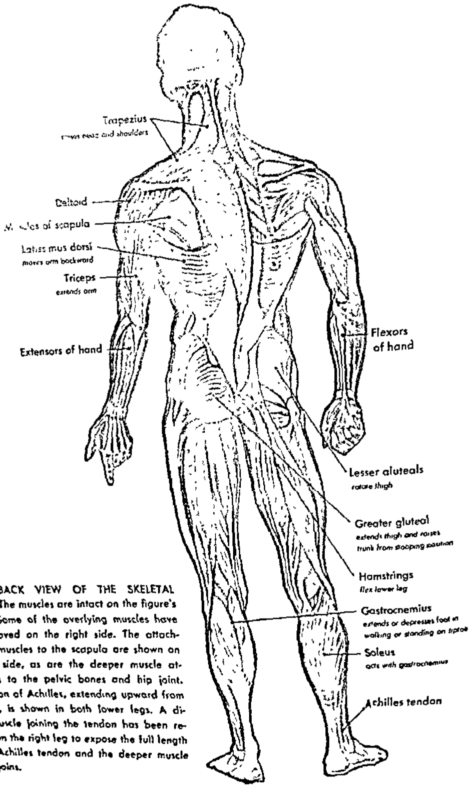



**Plate 4 BACK VIEW OF THE SKELETAL MUSCLES.** The muscles are intact on the figure's left side. Some of the overlying muscles have been removed on the right side. The attachments of muscles to the scapula are shown on the right side, as are the deeper muscle attachments to the pelvic bones and hip joint. The tendon of Achilles, extending upward from the heel, is shown in both lower legs. A divided muscle joining the tendon has been removed on the right leg to expose the full length of the Achilles tendon and the deeper muscle it also joins.

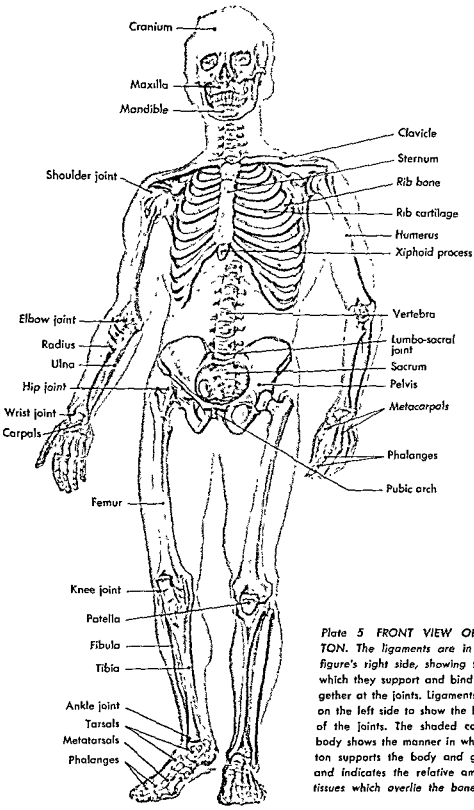
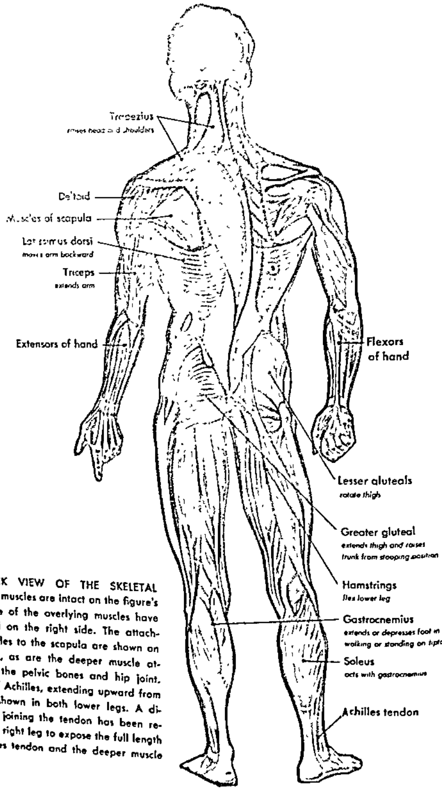



*Plate 5 FRONT VIEW OF THE SKELETON. The ligaments are in place on the figure's right side, showing the manner in* which they support and bind the bones together at the joints. Ligaments are removed on the left side to show the bony structure of the joints. The shaded contour of the body shows the manner in which the skeleton supports the body and gives it form, and indicates the relative amount of soft *tissues which overlie the bones.*

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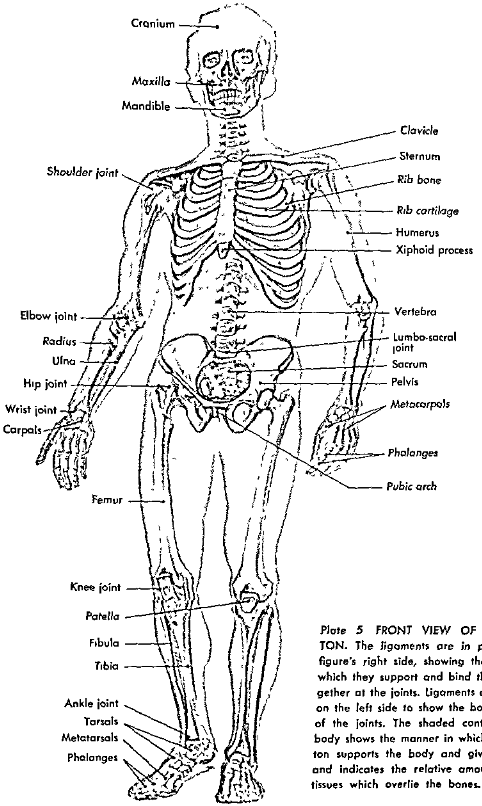


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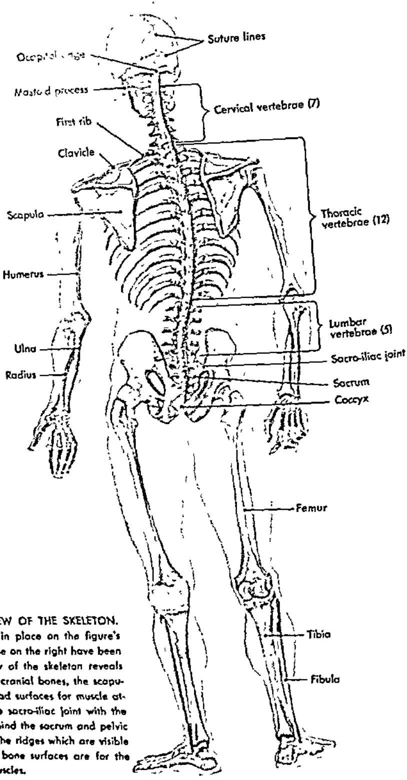



**Plate 6 BACK VIEW OF THE SKELETON.** The ligaments are in place on the figure's left side, while those on the right have been removed. This view of the skeleton reveals the sutures of the cranial bones, the scapulae with their broad surfaces for muscle attachment, and the sacro-iliac joint with the ligaments which bind the sacrum and pelvic bones together. The ridges which are visible on many of the bone surfaces are for the attachment of muscles.

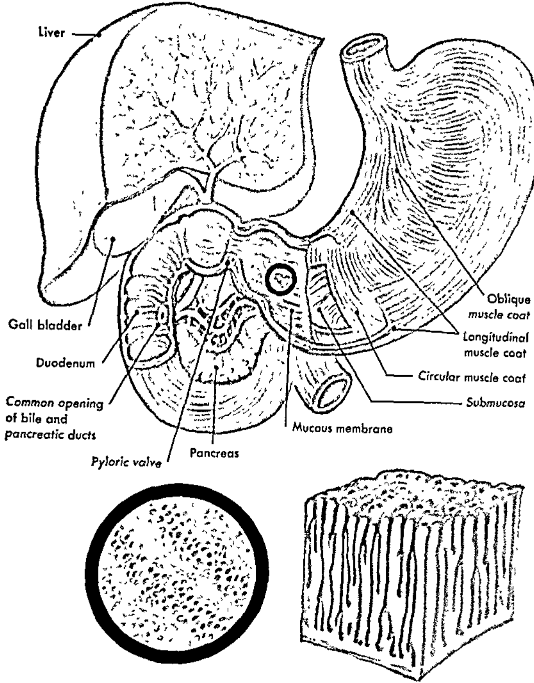



Plate 7 THE STOMACH AND RELATED ORGANS. The upper view shows the muscle *layers and mucous membrane lining the stomach.* The sectioned pyloric valve and upper *duodenum show internal structure. The sectioned* liver shows small bile ducts joining to *form the hepatic duct. The cystic duct from* the gall bladder joins this and becomes the common bile duct, which enters the duodenum with the pancreatic duct. The black circled area *at the lower left is a portion of the mucous mem*brane of the stomach highly magnified. Note *the folds and the many tiny pits, which are* openings of the gastric glands. Lower right, a *block of mucous membrane shows these* glands and their ducts in longitudinal view.

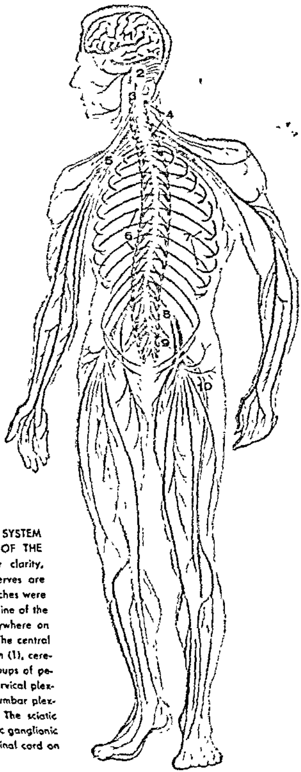



Plate 8 THE CENTRAL NERVOUS SYSTEM AND THE MAJOR NERVE TRUNKS OF THE PERIPHERAL NERVOUS SYSTEM. For clarity, only the major nerve trunks and nerves are shown. Actually, if all the nerve branches were shown, they would solidly fill this outline of the body, so that if a pin were put anywhere on the outline it would strike a nerve. The central nervous system includes the cerebrum (1), cerebellum (2), and spinal cord (3). Groups of peripheral nerves shown include the cervical plexus (4), the brachial plexus (5), the lumbar plexus (8), and the sacral plexus (9). The sciatic nerve (10) is shown. The sympathetic ganglionic chain (6) runs the length of the spinal cord on both sides.

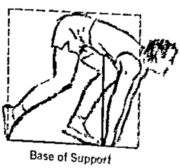
make effective use of the "principles approach" to human physical performance. While it is impossible to do little more than introduce the topic here, a brief discussion of some basic concepts follows.

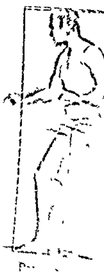
STABILITY The problems encountered in maintaining efficient stance, whether static or dynamic, begin with the area of the supporting base. In general, the broader or wider the base of support the more stable the stance. This principle is illustrated by the football lineman who prepares to meet the charge of his opponent by assuming a position with either one or both hands in contact with the ground. The position has the added advantage of significantly lowering the center of mass (or the center of gravity) of the body, which also improves his stability. The illustration in Figure 9.19 shows how both the area of supporting base and height of the center of gravity affect the stability of an object or a person.

It should be noted that the closer the gravity line (a line drawn from the center of gravity perpendicular to the earth's surface) is to the geometric center of the base of support the more stable the object will be. Conversely, as the center of gravity approaches the edge of the base of support, the object —or the individual—becomes progressively more unstable. The moment the gravity line falls outside the base of support the object will fall. Actually, this situation, on a controlled basis, may be entirely desirable. Walking is a good example of this phenomenon. As the body sways forward, the center of gravity falls forward of the front edge of the base of support, the body begins to fall only to be saved by the forward swing of the trailing leg. As a matter of fact, this sequence, which we call *walking*, has been described aptly as "a series of disasters, narrowly averted."

Similar conditions prevail in the stances assumed by athletes in various sports. The sprinter raises his center of gravity by raising his hips higher than his shoulders, then leans forward over his hands (see Figure 9.20) in order to become as *unstable* as possible in the direction in which he intends to move. As the gun sounds, no time is wasted in getting his body moving forward, driven by the force of his hard-driving legs. The wrestler, on the other hand, assumes a stance (when standing) with a lowered center of gravity and a gravity line directly over the center of the base of support. The reason for the difference here is that the wrestler does not

**FIGURE 9.20** Effect of location of gravity line on stability. Sprinter wishes to be "off balance" in order to move forward quickly; the wrestler may need to move suddenly in any direction.



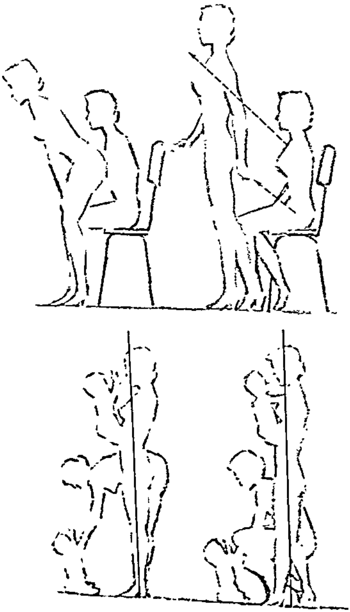


**FIGURE 9.23** Sitting, rising, and lifting. Above, proper placement of the feet provides a base of support permitting graceful sitting and rising. Below, placement of the feet and proper use of the legs result in a lifting technique that is both safe and attractive. Source: Ellen Davis Kelly—ADAPTED AND CORRECTIVE PHYSICAL EDUCATION—Fourth Edition—Copyright © 1965 The Ronald Press Company, New York.

sacral disc in bending from the waist (see Figure 9.22) to lift an object weighing 200 pounds. For a man of average dimensions (170 pounds) this force was calculated to be 1483 pounds. It is clear that under such conditions the spinal column needs strong support from the muscles in order to maintain its integrity. The irony of this situation is that these muscles (*erector spinae*) are almost completely inactive (apparently due to inhibition) when the back is fully flexed as shown in Figure 9.22. Basmajian reports that this situation persists during the initial movements of back extension (186). Thus, the lift must be initiated without the aid of the intimate supporting musculature. In this case it is easy to see the wisdom of bending the knees and performing the lift with the spine erect for greatest support.

In addition to remaining erect, it is important to channel the lines of force along the longitudinal axes of the spinal column and the long bones of the body rather than at right angles to them (see Figure 9.23). This means that any heavy object should be carried as close to the body as possible in order to avoid the necessity for small-muscle groups, which are not well designed for lifting, to counteract forces built up by leverage. In addition, the base of support should be made as wide as is practical. By avoiding sudden lifts, by keeping the forces parallel to long bones, including the spinal column, and by not attempting loads clearly beyond one's normal capacity, one should be able to go through life without ever suffering this kind of injury.

### Pain Avoidance

Another way in which faulty mechanics can contribute to malfunction of the body is often observed as a secondary or indirect result of an injury. People are reluctant to place themselves in positions where pain or discomfort is likely to occur. In fact, most people will go to considerable lengths to avoid this kind of discomfort. It should not be surprising, then, to learn that one of the frequent causes of muscular strain and spasm is a prior injury. Football trainers have for years been concerned with the rehabilitation of ankle and knee injuries sustained by athletes in this sport. One of the most frequently observed complications is the development of serious discomfort to the knee joint as a result of favoring an ankle injury. The injured player tends to walk with the affected foot turned outward with a limp, which causes the knee on that side to bend slightly during the weight-bearing phase. As this occurs, the ligaments on the medial or inner side of the knee joint are forced to bear the weight of the body in an unnatural manner, causing them to become strained and irritated. Similarly, low-back pain may result when a player favors an injured knee in such a manner as to throw an unusual amount of strain on the muscles of the lumbar region.

Dizzy Dean is a familiar name to baseball fans. This colorful, former professional baseball player was one of the truly great pitchers. He and his brother Paul pitched the St. Louis Cardinals to prominence in the late 1930s. During an all-star game in 1937, Dizzy Dean was struck on the foot by a batted ball. The injury was not serious, and he was soon pitching as usual. He felt some pain in his foot as he threw the ball, but Dizzy found that if he stepped slightly differently as he completed his delivery he had no pain in his foot. However, almost immediately an extremely serious inflammation developed in his arm and shoulder. A series of treatments helped to some extent, but his pitching effectiveness dropped rapidly, and he was forced to retire from the game. A slight alteration in his normal pitching pattern had thrown sufficient strain onto muscles unaccustomed to such a burden that they became severely injured.

Such substitution patterns are the rule rather than the exception wherever pain exists, whether the injury is slight or of major proportions. If the afflicted individual is aware of the dangers of such substitution patterns, he can take the necessary precautions to avoid further complications. Generally, such precautions must include the acceptance of the fact that some pain must be expected and endured if the injured limb is to be returned to full function.

## EFFERENT EFFECTS

### EFFECTS OF PHYSICAL ACTIVITY ON NEUROMUSCULAR AND SKELETAL FACTORS

We have outlined the basic structure and function of the neuromuscular and skeletal systems and have pointed out how human performance is limited by the capacities of these systems. In

other words, we have shown how one's exercise capacity is affected by one's levels of strength, endurance, power, flexibility, and the way in which one coordinates these elements into purposeful activity.

It is the purpose of this section to examine the other side of the coin, namely, how does exercise affect the organism?

You will remember that there are two broad categories of effects attributable to exercise or physical activity. The first is the immediate or *acute* effect. Examples would be such things as increased heart rate, increased respiration, perspiration, and similar systemic responses. In addition, the fatigue resulting from a bout of hard work, and even the muscle soreness experienced twenty-four hours later, are also generally classified as acute effects.

Chronic, or long-term, effects of exercise are, on the other hand, usually called *training effects*. Such effects would be observed over a relatively long period of time during which a series of exercise bouts occurred. Although it is possible for training effects to be observed in a very short period of time (perhaps only two or three days), in certain cases the term *training* usually refers to a period of several weeks or even several years.

Examples of chronic effects would be such things as increased strength, decreased heart rate for a given task, improved muscular coordination, and improved flexibility. Sometimes it is difficult to strictly separate training effects from learning. Indeed, in one sense, some kinds of motor learning might be considered to be effects of training because they are relatively permanent changes, and they have resulted from repeated exposure to a task. It should not be thought that "learning" and the chronic effects of exercise are synonymous. In most instances we are able to differentiate clearly between these two phenomena. Learning will be discussed in some detail elsewhere in this book.

## Strength

The immediate effect of exercise on strength, muscular endurance, and power is quite obvious. During vigorous participation, at least, there is a significant decrement in each of these parameters. As the recovery period progresses, the original levels are gradually regained. It is not expected, however, that a single experience will significantly improve strength or endurance levels. When a second trial does appear to be substantially better than the first, this disparity is usually explained as being due to "learning" rather than to any actual physiological change.

One of the problems frequently encountered in designing strength studies is that most test procedures involve the manipulation of testing apparatus requiring a certain amount of skill. Frequently, brief experience with such apparatus can produce significant increases in scores, even in the absence of any real "training effect." Figure 9.24 shows how such "practice" can affect scores on four successive days of testing. The lesson to be learned from

this illustration is that if a group were to be tested only once and then subjected to a training period, it would be impossible to determine how much of the improvement was due to actual strength gains and how much to the "learning" aspect of the test itself. (Of course, the use of a control group provides at least a partial solution to the problem. See Chapter 4.) Some investigators have adopted the practice of pretesting until a plateau is reached before beginning the actual training period.

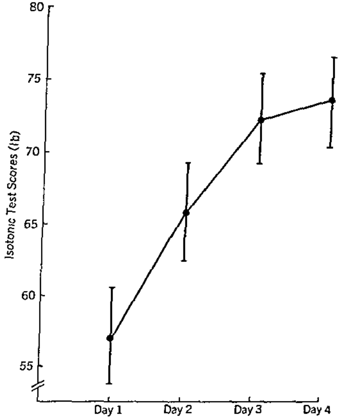



**FIGURE 9.24** This plot of isometric strength scores of six men shows that strength appeared to increase on tests administered over four successive days. Gains of this kind in the absence of training are usually attributed to "learning" rather than physiological improvement. Source: Irwin (263).

## Chronic Effects of Exercise on Strength

In recent years a great deal of research has gone into the study of the most effective ways of developing strength, power, and muscular endurance in man. This has been prompted primarily by those interested in improving the performance of athletes and by others working in physical rehabilitation.

ISOMETRIC STRENGTH TRAINING The work of two German physiologists, Theodore Hettinger and E. A. Muller, published in 1953, triggered a widespread interest in strength training systems based upon isometric contraction (479). Picked up by the popular press and promoted by equipment manufacturing concerns, "isometrics" has almost become a household word. So many claims have been made for exercise systems falling into this category that the original findings of Drs. Hettinger and Muller, as well as a wealth of information made available more recently, have been disregarded.

In the original Hettinger and Muller report, which dealt with the muscles of the forearm that flex the wrist, it was concluded that a single six-second contraction involving two thirds of maximal effort, performed once a day, would develop the strength of the muscles involved as rapidly and to as great an extent as they were capable of attaining. Under this program an increase in strength of 5 percent per week was reported. Subsequent studies, however,

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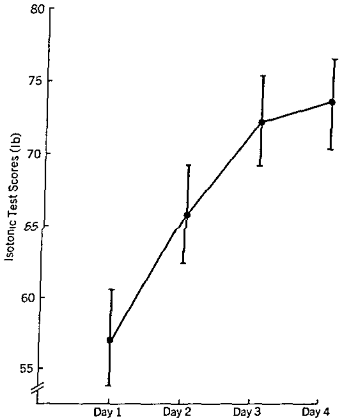


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indicated that this rate of increase does not always occur. In 1958 Hettinger found only a 3.3 percent increase per week, and in 1961 he reported a 1.8 percent increase. In these cases, however, a training program requiring only a single, one-second maximal contraction once a day was followed. One other important factor was discussed by Muller and Rohmert in 1963. This factor, called "endkraft," is the actual "limit" or ultimate strength potential of the individual. It was shown that the rate of strength increase was related to how close the subjects were to their "endkraft." Those who were close failed to improve as rapidly as others who were farther below their potential.

ISOMETRIC VERSUS ISOTONIC TRAINING
In recent years a great many other studies have been conducted in the area of isometric or static strength training. Although most of these studies have tended to confirm the basic findings of Hettinger and Muller, others have contradicted them (373, 449, 479, 606). Petersen (449) for example, using an experimental design similar to those of his predecessors, reported no such gains in strength as had been observed by Hettinger and Muller. Mayberry (373) also indicated that a program including a once-daily maximal contraction had no effect on strength.

In general, most studies have indicated that, at least for the average person or for those not close to "endkraft," isometric training can effectively increase isometric strength levels.

There is lack of general agreement on the relative merits of static and dynamic training procedures in strength development. Apparently the strength gains originally reported by Hettinger and Muller are somewhat higher than have generally been encountered by others, but this may be due to the fact

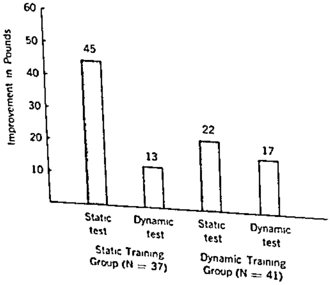



FIGURE 9.25 A comparison of the relative effects of isometric and isotonic tests. Data from Berger (51).

that their subjects were untrained individuals who were a long way from their peak potential, whereas subjects in other studies were often individuals in better than average physical condition.

One of the most important criticisms of isometric methods is that strength is not increased throughout the range of motion of the joint involved. Because there is no limb movement in this type of training, tension is exerted by the muscles involved only at certain angles of joint flexion. It has been demonstrated by Gardner (202) that very often strength improves at the particular training angle involved but is not changed at other points in the range of motion. It is probably for this reason that studies such as that reported by Berger (51) have found that if a person is trained by isometric methods and then tested by isometric methods, he will show the expected increases; if, on the other hand, he is tested by isotonic or dynamic methods (as in lifting a weight), his strength is relatively unaffected by isometric training. It is not so easy to explain why the reverse is also true. According to Berger (Figure (9.25), a person who trains by isotonic methods improves more when tested isotonically than when tested isometrically. This has been partially substantiated in a study in our own laboratory, where men training isotonically showed much greater gains on isotonic tests than on isometric tests (Figure 9.26).

Such phenomena as these are commonly observed when human adaptation to exercise stress is studied. The

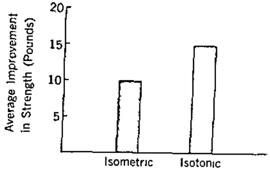



**FIGURE 9.26** Average improvement in a group of men engaged in isotonic training as measured by both isotonic and isometric means. *Data from Irwin (263).*

term used to describe this process is *specificity of training*, which simply means that a person gets what he trains for. This applies not only to static or dynamic strength but also to all the other factors we have described.

The use of eccentric contraction for building strength has received little attention as a means of strength development except, perhaps, in rehabilitation and therapeutic applications. The question has been raised, "Can eccentric training improve strength?" Theoretically, there is no reason to presume that it would not. Logan (350) concluded that there was little difference between the training effects of concentric and eccentric contractions of the quadriceps muscle groups. There has, however, been some work that indicates that eccentric training is not an effective method of increasing strength. Petersen (449), for example, concluded that eccentric training was not effective in increasing strength. The training load used in his study was approximately 20 to 30 percent

over the maximum *isometric* value obtained in testing. Subjects were simply required to lower this load slowly for a given number of times during each training session and were tested for maximum isometric strength before and after the training.

In order to shed more light on this question of strength development through eccentric training, a study was conducted in our laboratory (265), in which subjects were required to train with a load that constantly *exceeded* their maximal isotonic lifting ability to 20 percent. It was discovered that this training program was definitely effective in producing strength increases. The graph in Figure 9.27 shows the amount of improvement experienced by the experimental group as revealed by both isotonic and isometric tests. It is interesting to note that greater improvement resulted in the isotonic measure than in the isometric measure. The training task was performed on the same isontonic apparatus that was used for the isotonic strength test.

## Muscular Endurance

As was true of strength, it is doubtful whether there is such a thing as an acute effect of exercise where muscular endurance is involved. Some of the same problems of measurement are encountered, and the learning effect may compound the training effects.

The chronic effects of exercise on muscular endurance are sometimes quite startling. This is particularly true from the viewpoint of the layman who has failed to understand the important distinctions between strength and endurance. An example will serve to il-

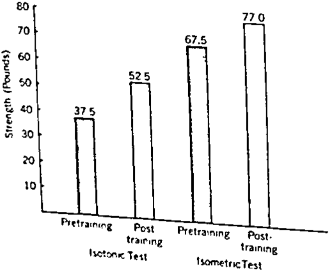



**FIGURE 9.27** Strength improvement resulting from eccentric muscular training as measured by both isotonic and isometric tests. Data from Irwin (263)

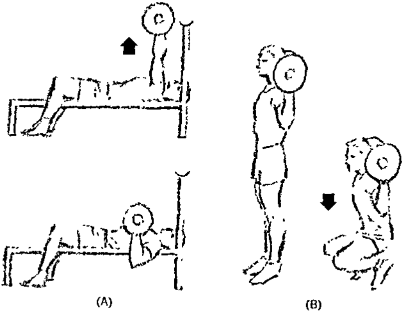



**FIGURE 9.28** Illustration of the bench press exercise (A) and the half-squat (B).

lustrate this concept: If a person desired to increase the strength of his triceps (the muscles that enable him to straighten his elbow), he could perform an exercise called "bench presses." In this exercise he lies on his back on a narrow bench and raises a barbell from his chest to a position above the chest with the arms fully extended (Figure 9.28).

Assuming that you could begin this exercise with about sixty-five pounds for four or five repetitions, you might reason that adding one or two repetitions each day should certainly increase the strength of the muscles involved in this task. If you were serious about your exercise program, highly motivated and conscientious, you could probably increase the number of repetitions of which you are capable from five to 100 in a relatively short training period. The question is, have you increased your strength? You will recall that strength was defined as the maximum force an individual is capable of exerting under a set of prescribed conditions. It is easy to see that in this situation the force necessary to raise the weight each time has not changed. We have seen that you would probably be able to raise the weight many more times than was previously possible (that is, muscular endurance has improved), but we do not know whether you would be capable of raising any greater weight. Experimental evidence indicates that you probably would not be able to lift a much greater weight than you would have been able to lift before the training period began.

In one recent experiment (583) subjects were asked to sit on the edge of a table and extend the lower leg to which a weight had been attached. As soon as all subjects could lift a maximum weight of sixty pounds once, they were

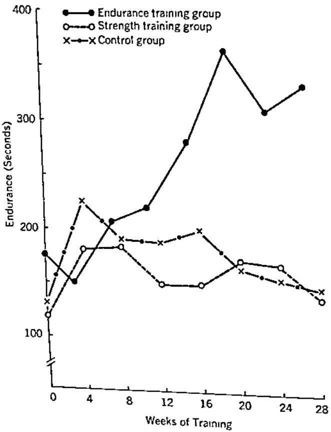



**FIGURE 9.29** Illustration of the specific effects of muscular endurance training. After the eighth week subjects training for endurance (isometric holding time) continued to improve; strength-training and control groups did not. Source: E. R. Vanderhoof, C. J. Imig, and H. M. Hines, "Effect of Muscle Strength and Endurance Development on Blood Flow," *Journal of Applied Physiology*, 16.873, 1961.

divided into two groups. Group I continued to lift the sixty-pound weight an increasing number of times each day for five weeks, eventually reaching 100 repetitions. Group II continued with ten repetitions of maximal weights each day (10 *RM*) for the five weeks. At the end of the experimental period, Group I was found to have no significant increase in strength, whereas the members of Group II had doubled their strength. Unfortunately, tests were not conducted to see whether this "overload" group (Group II) had also increased in endurance.

In another study that employed isometric strength and isometric endurance, it was demonstrated that subjects who participated in strength training increased in strength but not in endurance (Figure 9.29). On the other hand, it was found that subjects who trained for endurance (static holding time) increased in strength just as much as did the strength-training group (581). The finding would seem to imply that all endurance training also increases strength. It should be recalled, however, that many research studies of isometric training have demonstrated

strength gains resulting from contractions well below maximum. This would seem to be another bit of evidence in support of a submaximal strength training concept.

In general, the available research indicates that if one wishes to increase the strength of a muscle or muscle group, it is necessary to *overload* the movement the muscles produce. As strength increases, the overload must be constantly adjusted upward in order to assure continued improvement. As generally used, the term "overload" is somewhat inappropriate, but it does refer to the application of resistance that is substantially greater than is *normally encountered* by the muscles involved.

It should be noted that there is a number of ways in which an overload can be applied in training. The means utilized will depend upon the goals desired. And because the law of specificity is so important, considerable attention needs to be given to the training design.

If strength is desired, the resistance or weight should be progressively increased. Repetitions should be kept to a minimum, possibly to as few as two or three in a set, with sets repeated only after a rest period.

For the development of endurance, "repetition" becomes the key. Increasing the number of repetitions at a constant resistance, or the time of "holding" in the case of static work, is the type of overload indicated.

It is also possible to create an overload by increasing the rate at which work against a constant resistance is performed. From a theoretical standpoint this should be an effective type of overload for producing strength increases (237). From a practical standpoint, however, this approach has not been adequately demonstrated.

One of the arguments for isometric exercises has been that the overload is always at a maximum because every repetition was performed at the greatest force that the subject could exert. One of the early problems was the fact that the subject himself could never be sure that he was not deceiving himself

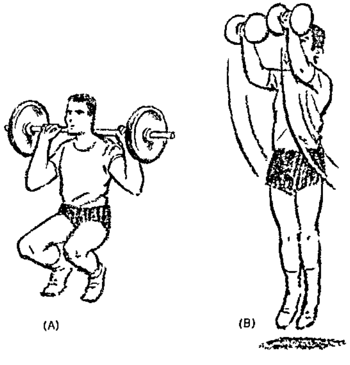



**FIGURE 9.30** Overload training techniques utilized in the experiment described in the text (A) standard squats; (B) jumping with weights held in hands.

drugs and hypnotic suggestion in such cases is quite common. However, the successful rehabilitation of such patients is almost always directly dependent on the persistence and determination of the patient.

Of course, all joint problems are not restricted to the condition of the surrounding musculature. Sometimes changes take place within the joint itself. Injury or disease can cause difficulties affecting joint surfaces, cartilage, ligaments or other surrounding tissues. Degenerative changes can also result from lack of movement. It is partly for this reason, if for no other, that physicians insist upon moderate exercises for patients suffering from diseases and injuries affecting the joints, even though pain is invariably involved.

### Acute Effects of Exercise

Most of us have experienced the fact that the ability to stretch and bend is considerably improved by some preliminary warming up exercises. Indeed, one of the criticisms of the Kraus-Weber tests was that children who were unable to touch their toes (and therefore flunked the test) were discovered to be able to perform this task satisfactorily after a brief practice or warm up period. While scientific documentation is lacking, the belief persists among experienced athletes and coaches that insufficient warm up before certain running and jumping events tends to increase the probability of "muscle pulls" and other injuries. (It should be noted that there is some evidence that this belief may be unfounded in fact) (292). In any case, it is evident that all of us (whether our joints are normal or impaired in some way) find our flexibility significantly improved after engaging in a few moments of preliminary activity during which muscles are stretched and "warmed up."

### Chronic Effects

As has already been indicated, the prescription of exercise for the improvement of flexibility is common. The fact is that flexibility can be tremendously improved over a reasonably short period. Although most of us tend to develop only the amount of flexibility required in our daily tasks, others have purposely utilized exercise to produce unusual ranges of joint motion. Practitioners of Yoga are good examples of people who fall into this category, as are some athletes, particularly swimmers, hurdlers, and gymnasts. Such extremes in flexibility are obviously not necessary for most of us, but the fact remains that normal flexibility is important and is relatively easy to attain through training. (Some simple tests of joint flexibility are presented on page 303.)

### Body Mechanics

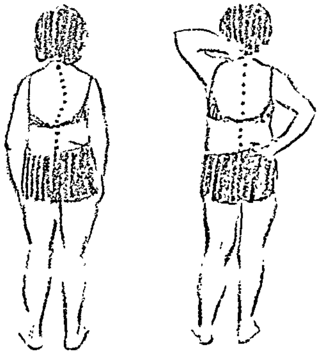
The basic structure of the body cannot be altered as an acute effect of one or two exercise bouts. Of course it is sometimes possible to momentarily

correct faulty alignment by the assumption of certain positions (see Figure 9.31), but as soon as such postures are dropped, the alignment problem reappears.

It is also true, of course, that a single lesson or demonstration can result in the learning of more efficient ways of performing some coordinated activity. This could be considered an improvement in body mechanics, and this is a desirable sort of end product.

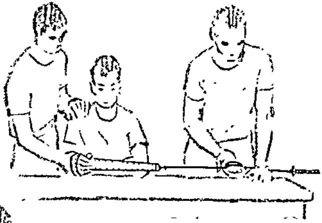
In general, however, substantial improvement in body structure or in the mechanical efficiency of the body does not occur without considerable effort over a period of time. A lateral curvature of the spine (scoliosis), for example, can sometimes be markedly improved by repeatedly stretching muscles on one side and strengthening muscles on the other. Such a program, requiring progressive overload training and active stretching exercises, usually requires quite some time to be effective. Similarly, certain faulty movement patterns require time and practice before they can be corrected satisfactorily. This may be because of the time required for a learning phenomenon to occur or simply because the required strength or endurance cannot be developed overnight.

Certain mechanical characteristics can never be altered by exercise. Although it may be argued whether basic body types (somatotypes) can ever be changed, it is apparent that a person with a small skeletal frame cannot make any extensive changes in this structure through exercise. In such cases the most that could be expected would be that a certain amount of muscular hypertrophy might give the appearance of a larger skeleton. Conversely, exercise can contribute to an apparent reduction in body size by means of weight reduction. This has no real effect on basic body structure. Such structure is determined by hereditary factors and can be altered little, if any, by exercise programs. The one exception to this rule might occur during the growth years, when it is conceivable that excessive exercise, or inadequate activity, might affect normal growth and developmental patterns (see Chapter 16).



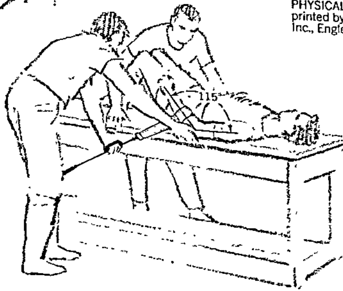
(A) (B)

FIGURE 9.31 The Key Position is used to obtain an indication of whether scoliosis is due to permanent structural deviations or to other, more easily correctable factors



Wrist Dorsal Flexion


Forearm Pronation




Elbow Flexion

**FIGURE 9.32** Inexpensive cable tensiometers can be used efficiently to test the strength of most muscle groups. Proper positioning and stabilization is important to prevent undesired muscle activity. Source: H. Harrison Clarke and David H. Clarke, DEVELOPMENTAL AND ADAPTED PHYSICAL EDUCATION, © 1963. Reprinted by permission of Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

# EVALUATION TECHNIQUES FOR NEUROMUSCULAR FUNCTION

## MUSCLE STRENGTH APPRAISAL

In terms of health, it appears to be much less important to appraise one's strength than to test CR capacity and flexibility, but it is of some importance as an index to general physical degeneration through the years. The techniques of measurement will be described briefly here. Strength measurement must involve equipment of some kind. Some of this equipment is so relatively inexpensive that one can generally find some means of evaluating strength on a continuing basis.

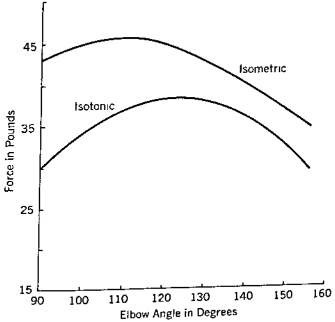
### Isometric Strength

Measurement of isometric strength requires some means of actually measuring the force exerted. In the laboratory, strain gauges, cable tensiometers, and dynamometers are utilized. It is not practical to discuss these instruments here. Commercial devices are available at most sporting goods stores at low cost that will suffice for isometric testing. With some knowledge of muscle groups and their actions and with some ingenuity one can devise a method to measure the isometric strength of almost any muscle or muscle group. Dr. H. Harrison Clarke, a pioneer in the science of isometric strength testing, has developed very objective and reliable techniques for measuring isometric strength of most large-muscle groups of the body (104).

There are some precautions to be followed if isometric testing is to be reliable and meaningful to you over the years:

1. The state of "fatigue" at time of test (general or local fatigue) will affect the results. Try to minimize this.
2. The position of the body must be the same and should eliminate other muscle groups as much as possible (see Figure 9.32).
3. Because your reading of isometric force will depend upon the angle at which you pull (Figure 9.33), keep this

**FIGURE 9.33** Maximum isometric force at various angles of pull and maximum isotonic force exerted continually through the range of motion for elbow flexors. Adapted by permission from W. Doss, and P. V. Karpovich, "A Comparison of Concentric, Eccentric, and Isometric Strength of Elbow Flexors," *Journal of Applied Physiology*, *20* 352, 1965.



the same each time you test a particular muscle or muscle group.

4. You should test-retest several times to establish the reliability of your scores.

### Dynamic or Isotonic Strength

Measurement of dynamic strength must involve either weights or some kind of laboratory equipment. To test for 1 RM, simply standardize body position and, by trial and error, establish the greatest weight you can move through the full range of motion. For the most reliable results, follow the precautions laid down for isometric tests—in other words, standardize as many environmental variables as possible. Allow at least five minutes between trials; when you know you are approaching your maximum, ten minutes' rest is advisable.

### Muscular Endurance (ME) Appraisal

In any attempt to evaluate muscular endurance, it is important to remember that muscular endurance is specific only for a given load. That is, for the same individual, moving a resistance of twenty pounds repeatedly is certainly not equivalent to an effort involving eighty pounds. Any test of ME will, by definition of strength, involve a resistance that is *less than maximal.* The number of times a movement can be repeated before "fatigue" sets in will depend, in addition to the actual ME and motivation, upon two factors: (1) the percentage of maximal involved (see Figure 9.34), and (2) the rate of contraction. Thus, if all other environmental and internal factors remain constant, the lighter the load and/or the slower the rate (up to a point), the greater will be the measured ME. A complicating factor must be considered, however. A slow rate, if it necessitates slow eccentric lengthening "contractions," will serve to shorten ME because of the additional work load involved in slowly lowering the weight. The procedure for testing ME must

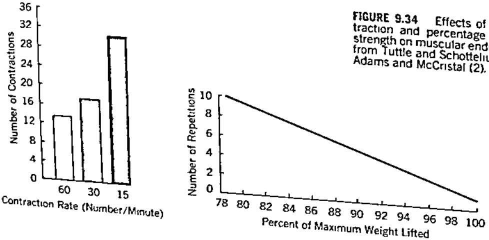



**FIGURE 9.34** Effects of rate of contraction and percentage of maximal strength on muscular endurance. Data from Tuttle and Schottelius (573) and Adams and McCristal (2).

therefore account for a standardized method of lowering the weight—either by gravity or by slow eccentric contractions. This factor becomes more critical as the rate of repetition is decreased.

It is a relatively simple matter to test isotonic endurance. Weights can often be employed but when these are not available, the traditional tests using the subject's own body weight as the resistance can be substituted (pull-ups,

TABLE 9.2 Standardization of Muscular Endurance Tests

| MUSCLE GROUP | TEST(S) | PROCEDURES TO BE STANDARDIZED |
|---|---|---|
| Elbow flexors | Biceps curl | Grip on bar (forward or reversed).<br>Distance between hands.<br>Back and shoulders fixed—back of head, shoulders, and hips against wall and heels 6 in. from wall<br>Always use same cadence or rate (30 to 36 per min). |
| Elbow flexors and shoulder extensors | Pull-ups[b] | Grip (forward or reverse).<br>Distance between hands.<br>Chin to bar level.<br>Full return to arm extension.<br>No kicking or kipping although break at hip permissible<br>Always use same cadence or rate (18 to 24 per min) |
| Elbow extensors | Overhead[a] press | (Grip palms away when bar is before chest)<br>Distance between hands<br>Full elbow extension<br>*Push*, don't thrust.<br>Always use same cadence or rate (30 to 36 per min). |
| | Push-ups[b] | Distance between hands (shoulder width for most people)<br>Back and knees straight.<br>Touch only chest or chin<br>Always use same cadence or rate (35 to 40 per min) |
| | Dips on parallel bars[a] | Width of bars.<br>Full extension at "top" and "down" to form 90° angle with upper and lower arm<br>No kicking or kipping.<br>Always use same cadence or rate (24 to 32 per min) |
| Abdominals | Bent knee[b] sit-ups | Knees bent to 45° angle<br>Do not hit floor or mat and "bounce up"<br>Hand position·<br>a. lace fingers behind head, or<br>b. at sides, or<br>c. across chest<br>May require something or someone to hold feet down.<br>Always use same cadence or rate (24 to 32 per min). |

[a]Not generally considered as applicable to women
[b]For persons unable to perform even one of these, there are several ways to work up to them (see page 296)

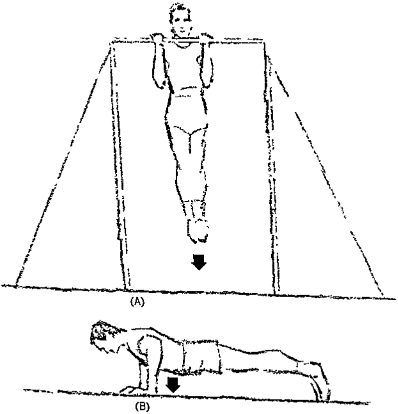



**FIGURE 9.35** "Holding" exercises for those unable to execute one pull-up (A) or one push-up (B). Get to the desired position any way you can and then hold as long as you can. (Think ahead to prevent injury when you reach the "end point"; a broken nose could result from falling to the floor from the push-up position if the head is not pulled back or turned to the side.) "Eccentric" exercises, denoted by the arrows, involve a slow release after reaching the "up" position. The same principles of "holding" and "eccentrics" can be applied to other ME exercises.

sit-ups, push-ups, or dips on parallel bars). Barbells and dumbbells enable one to test more different muscle groups. The important standardization procedures for tests that are reasonably practical as home tests are given in Table 9.2. For the most reliable results, resistance and rate should *always* be standardized, preferably with a metronome, for all ME tests.

Many other muscle groups can be tested (for example, leg extensors with "squat jumps," dumbbell tests for deltoids, pectorals, and so on), but with knowledge of the basic standardization principles and joint actions one can test almost any muscle group regularly over the years.

### Isometric Endurance Tests

Complex mechanical or electronic equipment (such as that used to record the isometric force in the study illustrated on page 264) is needed to

measure isometric force exerted over a period of time, but holding time is a practical self-testing technique if one wishes to test isometric endurance: holding time in the "up" position for pull-ups, holding dumbbells out to the side for "time," and so on.

This kind of testing has not been particularly practical and has received little attention except from an academic standpoint in the study of muscular strength and endurance. The one notable exception to this is the use of the flexed arm hang for girls in the AAHPER test.

### Isometric and Eccentric Training for Those Unable to Accomplish One Repetition of ME Tests

Performing three bouts of endurance isometric "holding" of position after using any means of getting *to* that position, as illustrated in Figure 9.35, is one possibility for working up to these tests. A second or possibly supplementary technique is to get to the position desired by some means and then to utilize eccentric or lengthening muscle work to return *slowly* to the starting position (see Figure 9.35B). Do this as often as possible before fatigue begins to set in.

### Modified ME Exercises for Women

There are "modified" pull-ups and push-ups for women (see Figure 9.36). It has been our experience that girls *can* learn to do regular push-ups. As soon as possible the regular exercise should replace the modified form.

### Anthropometric and Body Mechanics Appraisal

The following tests may be valuable in estimating total health and fitness. The value that a person attaches to these measurements depends on his accept-

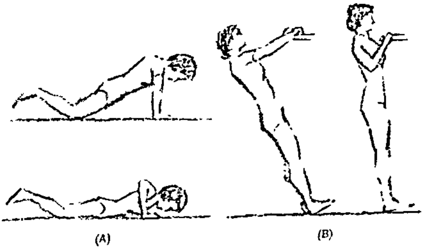



**FIGURE 9.36** Modified knee push-ups (A) and leaning pull-ups (B) for women.

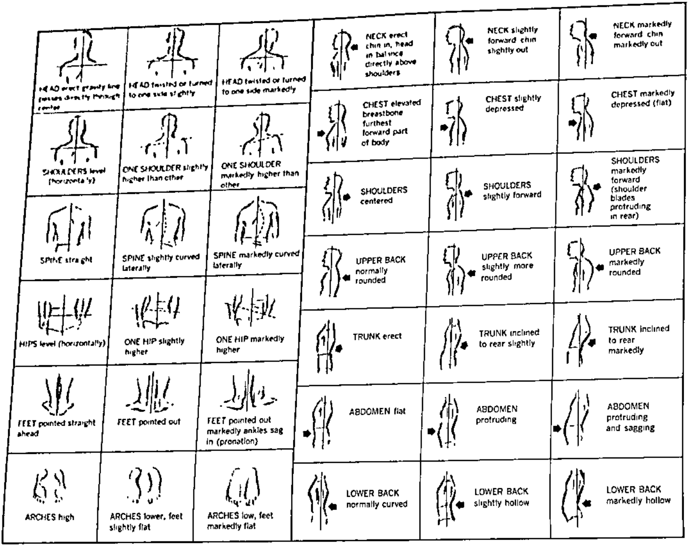



**FIGURE 9.37** Subjective analysis of postural and foot alignment. Source: New York State Education Department, New York State Physical Fitness Test. Reprinted by permission of the New York State Education Department.

ance of the principles previously discussed. It is our view that these measures are extremely important as a *preventive technique*. Some involve a partner or professional assistance.

POSTURAL ALIGNMENT In the typical class situation, postural alignment can often be evaluated by one of several photographic techniques or by an expert's rating scales, or by a variety of other techniques involving some specialized equipment. The use of polaroid photographs has been found to be one of the most practical techniques. Students are able to view themselves immediately, and the teacher's comments can be made on the spot. Lighting is much less of a problem with this technique than other photographic systems, and cameras are simple for an inexperienced person to operate.

Subjects should be photographed in *front of a grid* (or through a grid of tightly stretched strings) against a sharply contrasting background. Clothing being worn should be minimal (bathing suits or shorts are good) and at least two views should be taken (back and side are most useful). Up to four students can be photographed at one time, but care must be taken to ensure that each subject is aligned correctly with respect to the camera. Careful explanation of the purpose of the evaluation will make it much easier to avoid unnatural poses.

If the less objective methods of evaluation are used, attention to particular factors will facilitate the procedure. Check-lists such as that found on page 298 will be found helpful (Figure 9.37).

FEET Semiobjective means of appraising the functional state of the bone, ligamentous, and muscular structure of the feet are also illustrated in Figure 9.37.

## APPRAISAL OF FLEXIBILITY

There are laboratory tests of joint flexibility that involve some mechanical means of recording or measuring actual degrees of flexion, extension, or rotation. Without these devices it is difficult to test the exact flexibility of the important "joints," but there are some valuable "pass-or-fail" techniques and some objective and semiobjective methods available for self-testing. Some may require the aid of a mirror or a "partner" or helper.

1. The *trunk flexion* test ascertains the length and elasticity of the back and hamstring muscles (see Figure 9.38).
2. The *trunk extension* test determines the ability to hyperextend the spine (see Figure 9.39).
3. The *Kraus-Weber Test of Minimal Strength and Flexibility* (325) is a battery of tests designed primarily for children. Failure in any of these tests, with the possible exception of toe touching, in an adult is almost inexcusable unless there is irreversible muscle or joint pathology.

As shown in Figure 9.40, the test consists of (1) a sit-up with the legs held straight; (2) a sit-up with the knees bent and the feet held flat on the floor; (3) a ten-second leg lift with knees straight and heels held ten inches off the floor; (4) from a face-down position,

4. *Pass or fail tests* are simple tests that can generally be self-administered, although some may require another person to observe. *Remember*: do not force a joint movement abruptly. Sometimes several gentle, bouncing efforts will safely stretch or increase the measured range of motion. Anything short of the full range shown in the diagrams in Figure 9.42 is generally considered to be less than normal. Any drastic deviation from normal in either direction should certainly be checked for possible serious impairment of joint function.

It is important to remember that *no single test of flexibility is suitable as a measure of total body flexibility.* Joint flexibility is highly specific, and each joint must be tested individually if a total evaluation is to be made.

## MOTOR ABILITY APPRAISAL

Many tests of motor ability items are available, although it is not really clear what they measure, other than the ability to perform the specific tasks involved (see Chapter 5). A course in tests and measurements will assist you in making choices from among the several batteries commonly administered (38, 67, 332). Some examples of the types of items frequently found in these batteries are listed following. These should be regarded as being

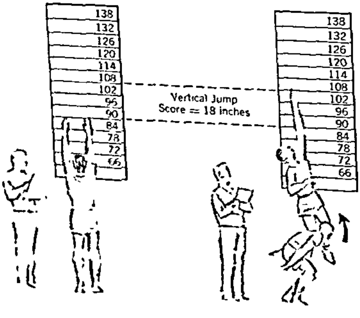



**FIGURE 9.43** Test of leg power: vertical jump. Subject standing flat footed reaches as high as possible on the board. From a crouch the subject leaps high and touches the board. The difference between the standing reach and the jumping reach is observed and recorded. Average score: men, 20"; women, 13".

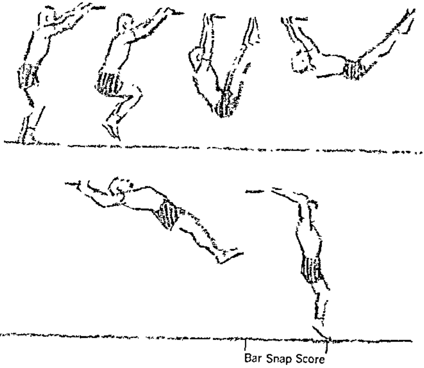



**FIGURE 9.44** Test of agility, power, *and coordination: bar snap. The sub*ject stands grasping the horizontal bar at shoulder height Jumping and swinging under the bar he extends his body, *releases his grip and lands on his feet.* Distance traveled beyond the bar is measured and recorded. Average score: men, 5′0″; women, 3′4″.

representative of commonly used tests; they are not necessarily the best available.

*Vertical jump* (Figure 9.43). This test of leg power requires that the subject jump from a stationary position (no running or stepping). *Score is equal* to the difference between the standing reach and highest point touched in the best of three trials.

*Bar snap* (Figure 9.44). The bar snap is a test of several factors involving power, coordination, and other factors. It is a challenging item and is responsive to changes with practice. Subjects are scored on their ability to thrust themselves in a horizontal direction. The bar is positioned at 4′6″ (may be adjusted to 5′0″), and distance is measured from a point directly beneath the bar to the point of landing (heel nearest the bar).

*Figure 8 run* (Figure 9.45). Agility *is often tested by a run designed to* test one's ability to change direction quickly. It is important to minimize *"straight" running in a test of agility.* The diagram shows the path to be followed by the subject in the figure *8* run. *Score is total time for one ex*cursion.

*Balance beam test.* One of several balance tests, the *TU* Balance Beam Test is designed to test elements of

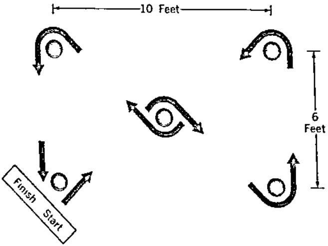



**FIGURE 9.45** Test of agility: figure 8 run. The subject is timed to the nearest tenth of a second on his ability to run (from a standing start) once around the obstacles placed as diagramed. Average score: men, 8 sec; women, 12 sec.

balance combined with other factors. On a two-inch-wide beam, twelve feet long, the subject performs a sequence of five moves for which he is awarded two points each (ten points total). Walk the length forward; walk the length backward; turn around; do a full squat and rise on both feet; do a full squat and rise while balancing on one foot. One point is subtracted for every time the subject needs aid in correcting his balance.

*Other balance tests.* Other balance tests are also commonly used (183, 371). Some of these are quite complex and require considerable expenditure for equipment. However, because tests on a stabilometer are challenging and interesting, and because the apparatus is relatively easy to construct, it is recommended that these devices be used when possible. One such device is illustrated in Figure 9.46.

*Speed.* Speed is generally tested by running 50 or 100 yards in as little time as possible.

*"True" speed.* This test eliminates the starting problem and attempts to measure top speed. Subjects are given a running start of at least fifty feet and *then* are timed for a twenty- or thirty-yard distance. The use of two watches would enable this test to be made at the same time as the regular speed test. Photoelectric cells can be used to good advantage in this type of testing.

*Reaction time* (see page 308). The measurement of reaction time requires special equipment that can be constructed or purchased. The timing device must be capable of measurement to at least 1/100 second. The Dekan Automatic Performance Analyzer and the Hale Reaction Timer are only two of the many devices available for this work. Reaction time can be simply measured for many different and specific actions, ranging from a simple response of the thumb up to total body response.

*Norms.* Average performances for men and women on the TU Balance

**FIGURE 9.46** *Tests of balance: (A) The TU Balance Beam Test is described in the text. Points are* subtracted for errors committed during the walking routine. (B) The stabilometer is a device that *records failure to maintain balance around a central pivot. Total time on balance is recorded for* a specified period. (C), (D), and (E) The stork stand, the diver's stance, and the stick balance are *all timed tests of ability to maintain balance.* Subjects, with eyes closed, are required to maintain the illustrated position for as long as possible.

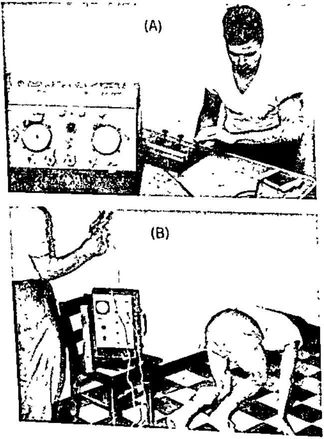



**FIGURE 9.47** Tests of reaction time: (A) A single test of "small muscle" reaction time requires the subject to release a key when the buzzer and/or light is observed. (B) "Large muscle" reaction time can be tested by requiring subjects to initiate movements such as the sprint start when the stimulus is heard or seen. Movement time and response time can be tested in similar ways.

Beam Test, their speed, and their reaction time are recorded in Appendix B; Figures 9.43, 9.44, and 9.45 include this information for the tests depicted. Other tests for fitness and motor skills are available from many sources. Fleischman (184) has analyzed many tests and makes several suggestions for interesting tests. Norms are available.

## COMMON DISORDERS OF THE NEUROMUSCULAR SYSTEM

Although it is not expected that physical educators or health educators will have a great deal of personal contact with serious disorders of the neuromuscular system of the body, it is their responsibility to educate the public about many of these conditions. In addition, some of these disabilities will be observed in school children, and special physical education programs need to be conducted on their behalf. Such programs are discussed in Chapter 17.

*Cerebral palsy* is caused by damage to the motor control centers of the brain. Such damage may occur before or during birth, or at any time afterward. Any

factor that deprives the brain cells of oxygen for any length of time can cause this kind of damage. The results can range from a slight muscular deviation to a total muscular disability. About one in every one thousand children will be affected with cerebral palsy. Generally, cerebral palsy produces one of the following types of disability:

1. Spasticity: a condition in which muscular movement is restricted because of contracture of the muscles. The muscles that support the body against gravity are commonly involved; hence maintenance of good posture is difficult. Mental impairment is more often associated with spasticity than with any other kind of palsy.
2. Athetosis: unlike the spastic, the athetoid has no difficulty in moving, but has a great tendency to move too much with many undesired movements.
3. Ataxia: a less common form of cerebral palsy, and is acquired rather than congenital. This individual would have a poor sense of body and limb position (kinesthesis).
4. Rigidity: a stiff, tense musculature resulting from hypertension of the muscles on both sides of a given joint and preventing movement in either direction.
5. Tremor: an involuntary, alternate contraction of the flexor and extensor muscles, producing a rhythmic motion.

*Epilepsy* is characterized by a short, sudden seizure of unconsciousness accompanied by convulsions. There are three major classifications: *grand mal*, which are infrequent, but severe seizures; *petit mal*, which are less severe but more frequent (the person may simply look blank and stare into space for a few seconds); and psychomotor seizures, which consist of episodes during which certain acts may be performed without the individual's being aware of them or remembering them. Epilepsy can be diagnosed by means of an electroencephalogram (EEG) in which characteristic brain wave patterns are observed.

*Hernia* is a protrusion of a loop of an organ through an opening in the abdominal wall. Frequently hernias are acquired by injuries or strains due to the lifting of heavy objects. Surgery is generally able to correct the abdominal weakness.

*Multiple sclerosis* is a disease once thought to be relatively rare. Onset occurs in the majority of cases between the ages of twenty and forty; the cause has not yet been discovered. A slow, scattered degeneration of nerve cells in the brain and spinal cord produces numbing, tingling sensations and eventual paralysis, blindness, loss of speech, and so on. This disease progresses slowly and may last for twenty-five years.

*Muscular dystrophy* (progressive muscular dystrophy) is a disease of early childhood in which there is a progressive muscular weakness accompanied by increased size of some of the weak muscles. Onset of the disease, generally found in boys, usually occurs between the ages of two and six. By age ten most patients have become unable to walk and by twenty most have died of respiratory infection.

Other less common dystrophies can affect both males and females. All types are progressive and result in relatively early death.

*Parkinson's disease* is a slow, progressive disorder of the central nervous system, which affects the life span. It is characterized by slowness of movement, weakness, muscular rigidity, and tremor.

*Myasthenia gravis* is characterized by a progressive weakness of the muscles, especially those of the throat, neck, and face. Although the cause is unknown, it appears to be related to the inability of the nerve impulse to cross the junction between the nerve and the muscle. Symptoms are always worse in the evening than in the morning because the muscles grow weaker with use. In 80 percent of the cases the disease does not affect the normal life span.

*Polyneuritis*, an inflammation of many nerves, is really a symptom rather than a disease per se. Mononeurítis is a similar inflammation of a single nerve. The causes may be manifold, and symptoms vary according to whether the fibers affected are primarily sensory (pain, tingling, and so on), or motor (paralysis). By prompt treatment the specific symptoms can usually be relieved, but in order to effect a cure the original cause must be determined and treated. Although recovery is usually rapid in mild cases, more severe involvement may result in chronic sensory, motor, or vasomotor disturbances.

*Raynaud's disease* is a condition in which the autonomic nervous system becomes hyperactive to the extent that spasm occurs in the blood vessels of the superficial tissues, resulting in a decrease in their diameter. Causes may be organic or nonorganic. Sensitivity to certain substances, such as arsenic, ergot, or tobacco, or even certain kinds of injuries may produce the syndrome. Emotional upsets or other psychological problems are frequently involved in this disease. Sometimes psychotherapy is successful in treatment. Gangrene may be present, but limited to the superficial tissues.

*Tetany* is a condition in which there are rhythmic spasms of the muscles in the ankles, feet, wrists, hands, and larynx. Sometimes convulsions also occur. The condition, which is due to a lack of calcium ions in the blood, is observed most often between the ages of three months and two years.

## COMMON DISORDERS OF THE SKELETAL SYSTEM

There are several classifications of arthritic conditions as well as a number of other diseases that are characterized by pain in and around joints leading to joint immobility. The cause of *rheumatoid arthritis*, which is one of the most severe and disabling of the joint diseases, is still unknown. Seventy-five percent of rheumatoid arthritis cases are women and onset begins before age forty.

*Osteoarthritis* is associated with aging and usually attacks those joints that undergo the most wear and tear. The splintering and disintegration of the

cartilage covering the ends of bones leaves the bone exposed and movement becomes painful.

*Gouty arthritis* (gout), a disorder affecting men chiefly, is characterized by attacks of acute arthritis and by the formation of chalky deposits in the joints. These deposits are made up chiefly of uric acid salts. Patients with gout have high concentrations of uric acid in the tissues and blood. Indications are that relief is almost immediate when meats, particularly sweetbreads, are limited.

*Bursitis* is the inflammation of the bursae, or pads that act to cushion the joint parts against friction. It may be caused by injury, infection, tuberculosis, or gout. There is local pain, swelling, and tenderness, with recovery usually spontaneous in one to two weeks unless the condition becomes chronic, in which case it will recur.

*Rickets* is a disease of the bones resulting from a deficiency of vitamin D. The child affected becomes irritable, weak, restless, anemic, flabby, and susceptible to infections. Characteristic deformities are bowlegs and pigeon breast, which occur as a result of the bones bending under weightbearing.

The Arthritis and Rheumatism Foundation indicates that persons who work outdoors and work with their hands are more susceptible. Farmers are particularly A-R—prone; factory workers are next in line. Professional and technical workers are least prone (172). In a review of the epidemiology of rheumatoid-arthritis, Cobb concludes:

> *Currently the following factors seem to be relevant: faulty immune mechanisms plus infection and/or joint injury, and a personality plus a social environment that lead to low self-esteem and resentment. Just how these things interact to produce arthritis is not as yet known. (108, p. 78)*

### Factors Associated with Arthritis and Rheumatism

AGE AND SEX The Arthritis and Rheumatism Foundation reports that more than half of those affected are under forty-five and also reports that there are three times as many women suffering from forms of this disease than men (172).

GEOGRAPHIC FACTORS In America, arthritis and rheumatism are more prevalent in the rural than in the urban population (578).

GENETICS At least one of the forms of A-R disease, gout, appears to be highly familial (172).

OTHER FACTORS Precipitating but not necessarily causative factors appear to be emotional and physical stress and strain, fatigue, injury, shock, exposure to cold, and chronic infections.

Gout is characterized by deposition of uric acid and crystals in the joints and a "clinically silent" increase in serum uric acid from a normal of 4 mg percent to as high as 12 mg percent almost invariably precedes the joint infection and acute inflammatory reaction (172).

After years of working with experimental "stress" in animals and consideration of clinical histories in human beings, Hans Selye concluded:

*All this makes it quite clear that the rheumatic maladies are really typical diseases of adaptation, because if the body's defenses are adequate the disease is suppressed without any intervention by the physician Here the primary disease-producer (whatever it may be) is certainly not very harmful in itself. When the inflammatory barricade against it is removed by hormones—be they secreted by the glands or administered by the physician—the causative agent (germ, poison) of the rheumatoid diseases does not produce much tissue-destruction. These diseases are essentially due to inadequate adaptive reactions against comparatively innocuous injuries. They are due to maladaptation (505, p. 165). [See Chapter 18.]*

In their text *Psychosomatic Medicine*, Weiss and English summarize their section on chronic arthritis by saying:

*We believe that there are, within the individual, certain emotional factors that may express themselves through tension and spasms of the voluntary muscular system and thus influence the working of the joints. If this occurs in an individual who for some reason is predisposed to the development of chronic arthritis, then the emotional factor may be important. In other words, if there are numerous interacting factors such as predisposition, fatigue, (which may also be psychologically determined), specific infection, and perhaps even other factors, then arthritis may develop (601, p. 510).*

## SUMMARY

Without the intimate interaction of three distinct systems, the human body would be unable to function. Although these systems (nervous, muscular, and skeletal) are readily differentiated from one another structurally, they cannot function as separate entities.

The jobs of communication and decision-making are the responsibility of the nervous system. The muscular system is concerned with movement and maintenance of the upright posture. The skeletal system collaborates with the other two to produce movement by its action as a system of complex levers. Its other functions of protection and blood cell production are distinct from its roles in support and locomotion.

A knowledge of the anatomy and physiology of these three fundamental systems is essential to the understanding of human learning, movement, fitness, health, and disease. The explanation and prediction of behavior, and the influencing of behavior, depend upon this kind of understanding.

The exact mechanism by which muscle tissue contracts is not well understood, although great strides have been made recently in identifying important factors in its function. The contractile substance (proteins called actin and myosin), its arrangement, and the means by which it is excited have all been topics of productive investigation.

The fundamental unit of neuromuscular function consists of a single motor neuron together with all the muscle fibers that it innervates. Activity in the central nervous system modifies the

function of the neuromuscular system is the matter of adequate appraisal of status and progress. Knowledge of appropriate tools and techniques of measurement is prerequisite to success in any educational or physical training program.

## PRINCIPLES

1. Under the proper circumstances, practically anyone can substantially increase his strength and muscular endurance.

2. In general, the activity of one division of the autonomic nervous system is antagonistic to the activity of the other. The sympathetic system acts to prepare the body to respond to emergency situations, whereas the parasympathetic is concerned with maintaining homeostasis.

3. In cases where movement of any kind is involved, initiation and coordination are the functions of the somatic system.

4. If a given stimulus is of sufficient strength to cause a neuron to fire, the application of a stronger stimulus would have no greater effect insofar as the intensity of the discharge is concerned. This is called the all-or-none law of neural transmission.

5. At a synapse, impulses are permitted to cross in one direction only: from afferent neurons to efferent neurons.

6. Whenever a muscle fiber is stimulated by the neuron (nerve fiber) that innervates it, it shortens to its maximum capacity. This is called the all-or-none law of neuromuscular function.

7. The gradation of force exerted by a muscle may be accomplished in either of two ways: (a) recruitment of additional motor units or (b) increased rate of fire of participating motor units.

8. Gross alterations in required muscular force are achieved by recruitment, whereas fine adjustments are achieved by means of frequency changes.

9. Low threshold motor units are involved in most movements, whereas high threshold units may be activated only rarely when extreme force is required.

10. One theoretical means of increasing strength would be to involve somehow the very high threshold motor units that are seldom or never activated.

11. Central inhibition and facilitation exert great influences on the strength levels achieved by an individual.

12. Unlike certain other limitations imposed upon us by nature, the neuromuscular limits are, to a large extent, under our own control.

13. Approximately half of the work done in most lifting movements involves eccentric contraction of muscles.

14. Flexibility is a highly specific factor; full range of motion in one joint is no indication of the status of other joints of the body.

15. Contrary to common belief, weight training (properly practiced) does not lead to muscle-boundness but can actually increase joint flexibility.

16. Whereas man-made machines wear out with use, the human "machine" becomes more efficient with use.

17. Whenever one body segment deviates from a position directly over its point of support, compensation must

occur elsewhere in the body in order to prevent the whole body from becoming unbalanced in that direction. (For every zig there must be a zag.)

18. Stability of an object or individual is increased:

  a. in direct proportion to the area of supporting base;

  b. in inverse proportion to the height of the center of gravity;

  c. in direct proportion to its mass;

  d. *in direct proportion to the close-*ness of the gravity line to the center of the base of support.

19. Mechanical efficiency must sometimes be sacrificed in competitive performance in the interests of strategy or deception.

20. The phenomenon of pain-avoidance is frequently responsible for the creation of secondary impairment.

21. Isometric training can be effective in increasing the strength levels of most people, but the amount of potential increase is dependent upon how close subjects are to "endkraft."

22. "Specificity of training" simply indicates that one gets the kind of results he trains for. Training methods must be specific *to the desired outcomes.*

23. In general, if one wishes to increase the strength (or endurance) of a muscle it is necessary to overload the movement produced by the muscles *involved. For strength, resistance* must be increased beyond levels normally encountered; for endurance the number of repetitions or holding time must be increased.

24. Basic body structure is largely determined by heredity and can be altered little by exercise programs, particularly after the growth years.

## EXPERIMENTS AND EXPERIENCES

1. *Divide the class into two groups* by some random procedure. Test both groups on maximal strength of a given muscle group (biceps brachii, for example) either by determining 1 RM or by use of a static test such as a cable *tension test. Also test* the maximum number of full contractions (at a controlled frequency) that each subject can perform against a resistance of 40 percent of his maximum. (A standard load can be used by all subjects if preferred.) *Calculate a rank order* correlation of strength and endurance scores. Make a scattergram plot of the scores. What conclusions can you draw about the relationship between strength and muscular endurance?

2. *Select two groups of volunteers of* at least six subjects each. Test subjects for maximum strength of a given muscle group (biceps or quadriceps) using either dynamic or static methods. Test each subject for maximal muscular en*durance on a standard load.*

Subjects in one group should be assigned to training every other day for at least four weeks (six to ten would be better) in which they use a 4 RM system. Attempt to increase by at least one pound each session.

Members of the second group should also train every other day in an attempt to increase the number of repetitions with the standard weight. (Training time should not exceed five minutes a day for either group.)

All subjects should be retested for both strength and endurance at the end of the training period. Comparative changes should be noted.

If sufficient subjects are available, a third group could be added to serve as a control. This group should have no weight training experience during the training period. If desired, a fourth group, training by isometric techniques, could be utilized.

3. Using a goniometer or a protractor with an attached arm, measure the range of motion of the knee in at least ten subjects. Using weights or a cable tensiometer, measure the "maximal" strength of the hamstrings and quadriceps. Make scattergrams of (1) flexibility versus quadriceps strength; (2) flexibility versus hamstrings strength; (3) flexibility versus total of quadriceps and hamstrings strength. Estimate the "line of best fit" for each plot and draw conclusions. Variations: Utilize other joints such as the elbow, wrist, or ankle.

4. For this demonstration use blocks of wood or other substance cut in the shape of a pyramid, cube, rectangle, and so on. Demonstrate the force necessary for tipping each object over. A "tight-rope walker" can be constructed by use of wires and weights which actually places the center of gravity *below* the base of support. A child's toy of this type may be available. Various stances assumed in sports can be demonstrated (track start, football linemen and backs, wrestlers, and boxers) as can positions taken to counteract inertia in subways and on busses, and so on.

5. One subject is sufficient for demonstrating the principles involved in this experiment. Two balance-type scales (or one scale and one platform the same height as the surface of the scale) and a specially prepared board are required. The board should be of measured length (a round number such as 80 inches) and have a vertical marking peg projecting upward at the exact center. Under each end should be a piece fashioned into a knife edge which rests on the scale and platform surface. The empty board should be balanced and the scale(s) zeroed.

A female subject wearing flat heels then stands with both medial malleoli in contact with the marker and the scales rebalanced. The weight indicated on each scale is recorded (or weight on one is recorded and the weight supported by the platform obtained by subtracting from the total weight of the subject). The position of the gravity line with respect to the medial malleoli is calculated:

$$F_a \times F_aA = F_b \times F_bA$$

where $F_a$ = the reading on Scale $A$; $F_b$ = the reading on Scale $B$; $F_aA = X$; $F_bA$ = total board length minus $X$.

The distance $X$ indicates how far the $A$ end of the board is from the gravity line. By subtraction the position of the gravity line from the medial malleoli can be obtained. Similar measurements are made for the same subject immediately after putting on high heels. An observer at the scale should attempt to get a reading as quickly as possible, and if the reading seems to be moving, the direction and the magnitude of the shift should be noted.

Note: Postural adjustments occur very rapidly and the observation of this fact is a part of the experiment. Calculations should be made to see if any "permanent" change has occurred in the position of the gravity line.

## SUGGESTED READINGS

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# Digestion and Metabolism

## Chapter 10

One needs only to browse through any recent home magazine or women's magazine to find at least one article, if not indeed several, extolling the virtue of some supposedly new diet or weight reduction scheme. The American public has been literally deluged with advertisement and literature concerning foods and fads, supplements, and low-calorie this-and-that. Almost as prevalent are articles about slimming and weight reduction exercises. In short, the American public is (or, at least, is thought by publishers to be) extremely nutrition conscious. Perhaps, even more, they are weight and calorie conscious. One often wonders how much of the information would be necessary if people once-and-for-all came to really understand the basic, known principles of nutrition and weight control.

Nutrition and weight control education are legitimate and extremely important facets of health education and physical education. You will need a sound understanding of the principles of digestion and metabolism. To that end, an introduction to these topics precedes a somewhat complete presentation of the principles of nutrition and weight control.

## AFFERENT CONCEPTS

### ANATOMY AND GENERAL FUNCTION

The function of digestion is to prepare food for the process of absorption and metabolism. This, of course, includes both the mechanical and the chemical aspects of digestion. The former involves chewing, swallowing, movement of food through the esophagus into the stomach and on through the intestines (peristalsis) and, finally, defecation or elimination. Chemical digestion includes all the changes in the chemical composition of food as it passes through the alimentary canal: the breakdown of starches to simple sugars or monosaccharides (mainly glucose), the conversion of proteins to amino acids, the changing of fats to fatty acids and glycerol, and so on. All these changes, which are necessary to prepare the food for absorption, are dependent upon the activity of a variety of digestive enzymes.

A starch-splitting enzyme in saliva, called ptyalin, begins the process of digestion while food is still in the mouth. The partially digested starches, together with the rest of the food, reach the stomach via the esophagus.

Strong muscles in the stomach walls provide the mechanical force for mixing the food with the gastric fluid. These

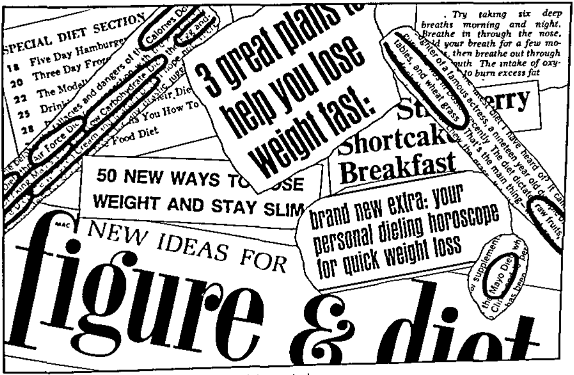



FIGURE 10.1 Fads. diet, exercise, and weight control

changes take place in the stomach: digestion of starch continues until the contents of the stomach become acid; an initial splitting of protein occurs and the food is churned to a milklike paste, called *chyme*.

In the small intestine, bile from the liver, juices from the pancreas, and secretions from within the intestinal walls combine with the chyme. Foods are broken down to amino acids, simple sugars, fatty acids, and glycerol, which the cells can use. These are absorbed continually from the small intestine into the bloodstream. As they are absorbed through the intestinal walls, they are carried into the bloodstream and to the cells to be used for energy or to become part of the body. The waste materials not absorbed are carried on into the large intestine to be excreted. Only water is absorbed from the large intestine.

Calorie is the term given to the energy values of food in terms of the large kilogram calorie, the unit customarily used by nutritionists for measuring the energy needs and expenditures of man and the energy value of food. The large or kilogram calorie (kilocalorie) is the amount of heat required to raise the temperature of one kilogram of water one degree centigrade. (You can conceptualize a large calorie very roughly as the amount of heat produced by the flame of a one-half-inch-diameter candle in about one minute.) We shall use the term "calorie" as synonymous with kilocalorie.

The basal metabolic rate (BMR) is the amount of heat expended by the body while in a complete resting state. When a physician determines an individual's basal metabolic rate he does so after instructing his patient not to eat any food for twelve hours prior to the test and to get a good night's sleep. Just before the test the subject rests for thirty minutes in a supine position in a quiet room where the temperature is between 68 and 75 degrees Fahrenheit. The basal metabolic rate is usually determined indirectly by measuring the oxygen consumed for a period of from eight to ten minutes. In the postabsorptive state, one liter of $O_2$ used means an expenditure of about 4.82 calories. Thus the caloric expenditure in calories per hour per square meter of body surface can be estimated. Clinics usually compare a patient's BMR with the age and sex norms, as illustrated in Figure 10.16. They can report the BMR to the person as a plus or minus deviation from the norm. For example, a person with a low metabolic rate may be told his BMR is −22 percent.

The specific dynamic action (SDA) of food exerts a measurable influence on BMR, increasing it for as long as twelve hours after a meal and by as much as 70 percent. Proteins cause the greatest and longest-lasting SDA. A more typical SDA is a 10 to 15 percent increase for five hours. The effect is largely due to chemical reactions involved in digestion, absorption, and storage.

## The Liver

The liver (see Figure 10.2 and Plate 7) is not generally considered to be a system but it will be discussed briefly

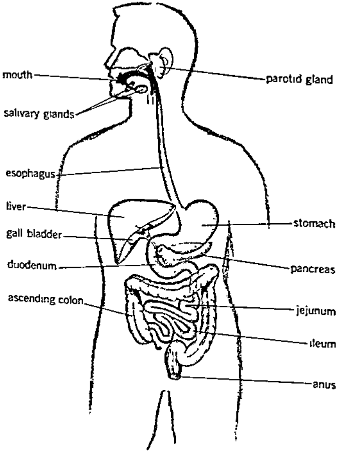



FIGURE 10.3 Digestive tract. By permission from A. C. Guyton, *Function of the Human Body*. Philadelphia: W. B. Saunders Company, 1964, p. 8.

adrenal medulla, increases metabolic rate.

We must consider the excretory system (see Figure 8.8) a part of the systems affecting metabolism because it is responsible for the removal of waste produced by metabolic processes.

The gross anatomy of the digestive system is illustrated in Figure 10.3 and in Plate 7. The pancreas and liver, which also serve purposes other than digestive, are very important parts of this system.

## FUNCTION IN EXERCISE

Generally speaking, the digestive system has little if any function during the actual exercise period. There may be exceptions to this, as in the case of very long marathon runs or distance swimming during which food may be ingested in order to supply needed energy. Under the usually prevailing circumstances, however, all the energy that will be utilized has already been supplied and stored in one form or an-

other in the body. Because the digestion and absorption of food is a somewhat slow process, it is readily seen that eating immediately before or during a contest would usually have little if any benefit.

Of course, it is important that proper nutritional practices be followed if sufficient energy stores are to be available to sustain vigorous activity. The energy to sustain muscular work is derived from the combination of oxygen with these energy-rich compounds that have been stored in the muscles and elsewhere. Limitations on performance are set by the extent of availability of oxygen and the food-derived energy source (glucose, fats, proteins, and so on) as well as by the accumulation of the waste products of metabolism ($CO_2$, lactic acid, and so on).

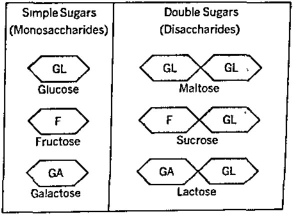
During exercise the rate of metabolism increases as more food is utilized to supply the energy requirement of the specific activity.

## HUMAN DIETARY REQUIREMENTS

### Protein, Carbohydrates, and Fat

The amino acids that make up proteins are needed to build, repair, and regulate the function of the body's cells. They are found in meat, fish, poultry, eggs, milk, nuts, dried peas and beans, bread, cereals, and vegetables.

There are twenty-three amino acids needed by the body. The thirteen *nonessential* acids are so named because they can be manufactured by the body. The ten essential amino acids must be supplied in the diet. The surest sources



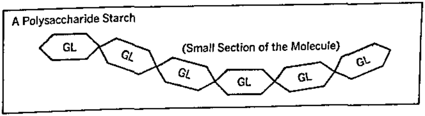




**FIGURE 10.4** Schematic diagram of molecular structure of dietary carbohydrates By permission from Bogert, Briggs, and Calloway, *Nutrition and Physical Fitness*. Philadelphia. W. B. Saunders Company, 1966, p. 22.

are the meats, although a careful selection of a combination of various vegetable proteins can also provide the essential acids.

Carbohydrates are needed to supply energy, to furnish heat, and to save proteins for building and regulating cells. Carbohydrates, found in fruit, most vegetables, bread, cereal, and milk, are the primary energy source for the body. Carbohydrates are normally ingested as disaccharides (su-

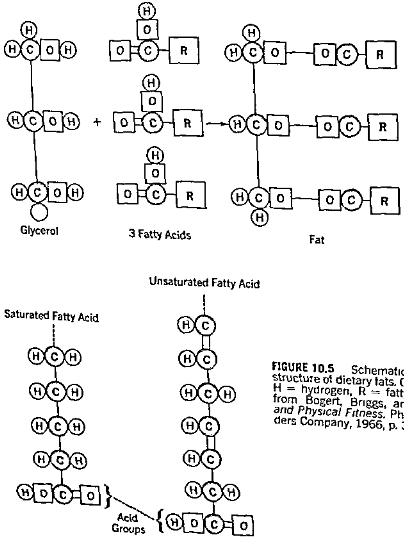



**FIGURE 10.5** Schematic diagram of molecular structure of dietary fats. C = carbon, O = oxygen, H = hydrogen, R = fatty acid. By permission from Bogert, Briggs, and Calloway, *Nutrition and Physical Fitness*. Philadelphia: W. B. Saunders Company, 1966, p. 31.

crose, maltose, or lactose) and as highly complex starches (see Figure 10.4).

Fats are a second source of energy and are the primary storage form of foods not utilized immediately by the body. Fat is found in butter, margarine, cream, oils, meat, whole milk, peanuts, nuts, and avocados.

Carbohydrates yield twenty-six percent more calories per liter of oxygen than do fats (5.0 to 4.7), although fat produces more than twice as many calories per gram as do carbohydrates (9.0 to 4.0).

The fats we eat mostly are triglycerides (one molecule of glycerol combined with three molecules of fatty acid). If all the carbon atoms in the long carbon chain of the fatty acid have attached to them as many hydrogen atoms as they can hold, the fat is said to be "saturated." When one or more carbon atoms are not saturated with hydrogen, the fat is said to be "unsaturated." More than one unsaturated carbon atom identifies the fat as "polyunsaturated" (see Figure 10.5). The polyunsaturated fatty acids are essential in human nutrition, because the body needs them and cannot manufacture certain ones. These are known as the "essential fatty acids," and they must be included in the diet. Linoleic acid is the most important of these because the others (linolenic and arachidonic) can be synthesized from it by the body.

Excess nutrients, whether protein, carbohydrate, or fat, are stored largely as neutral fat (triglycerides), which is then available for energy, just as is the stored form of carbohydrate (glycogen).

## Vitamins and Minerals

A vitamin is an organic substance that is essential, in very small quantities, for normal metabolism of the body's cells. Figure 10.6 will give you some idea of the general functions and common sources of vitamins, and Table 10.1 lists the most important ones, their functions, the best sources of them, and the results of their deficiencies.

*Minerals (inorganic nutrients)* are also essential, in small amounts, for normal body function. They have been classified as follows:

1. As components of the hard tissues (bones and teeth)
2. As essential components of soft tissues
3. As constituents of the body fluids

Table 10.2 summarizes the importance of the minerals. Although a balanced diet easily supplies the small amounts of these elements needed by the body, the supply of iron, calcium, iodine, and phosphorous is most likely to be critical (86, 142). The best sources of these are:

1. Calcium: milk and cheese, shellfish, egg yolk, canned sardines and salmon (with bones), soybeans, and green vegetables
2. Iron: liver (best source), heart, kidney, liver sausage, lean meats, shellfish, egg yolk, and dark molasses
3. Iodine: seafood, vegetables grown in iodine-rich soil, iodized salt (surest source)
4. Phosphorous: animal proteins, milk and cheeses, and nuts and legumes (86)

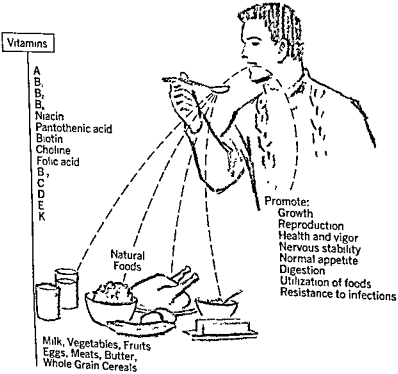



**FIGURE 10.6** Different vitamins found in natural foods and their general functions in the body. By permission from Bogert, Briggs, and Calloway, *Nutrition and Physical Fitness.* Philadelphia: W. B. Saunders Company, 1966, p. 205

## Water

Water is essential to maintain life. In fact, we can live longer without food than without water! Water makes up about 75 percent of a newborn infant's total body weight, and it decreases proportionately until adulthood, when some 57 percent of the body is water (224). Water provides a medium for transporting materials and provides a medium within the cell in which its chemical reactions take place. Approximately two to three quarts a day must be ingested to replace the amount excreted via the kidneys, skin, feces, and lungs. The amount lost and the requirement vary with environmental conditions, exercise, and, of course, vary in health and disease. The scheme of water balance is illustrated in Figure 10.7.

Dehydration is a serious condition that can result from a negative shift in the water balance and is most commonly caused by exercise in a hot, humid environment and by excessive vomiting, especially in children and women nauseated during the first months of pregnancy. Dehydration is discussed further in Chapter 11.

## Recommended Dietary Allowances

The United States Department of Agriculture has classified foods according to their contribution of the several nutrients. The guide encourages wide choice in food selection.

**TABLE 10.1 Vitamins, Their Sources, Functions; and Deficiency Diseases and Disorders**

| VITAMIN | SOURCE | BODY FUNCTION EFFECT | DEFICIENCY RESULTS |
|---|---|---|---|
| A | Green leafy vegetables, milk, butter, eggs, liver, fish-liver | Essential to cell function of skin and cells lining the membrane of eye, also night vision | Overgrowth of skin; disease of the eye called xerophthalmia, night blindness |
| $B_1$(Thiamine) | Yeast, potato, liver, grains, eggs, meat, vegetables | Influential in stimulating growth, important for proper function of nerves; aids sugar metabolism | Beriberi; heart disease, neuritis |
| $B_2$(Riboflavin) | Eggs, milk, liver, meats, cheese | Important in metabolism of all body cells, promotes growth | Overgrowth of skin (keratosis), cracking of skin in corners of the mouth (cheilosis), inflammation of the tongue (glossitis), fear of light (photophobia) |
| Nicotinic acid (Niacin) | Liver, wheat, yeast, meat | Essential to good health, promotes growth, aids sugar metabolism, important for normal intestinal function | Pellagra (skin disease), inflammation of tongue, nervous disorders |
| $B_6$ | Liver, cereals, fish, vegetables, yeast | Important for proper protein metabolism; essential to cell function | Nerve inflammation, skin irritation, such as seborrhea |
| $B_{12}$ | Eggs, milk, liver, meats | Important in fat and sugar metabolism, also in formation of blood, promotes growth | Pernicious anemia, neuritis |
| C(Ascorbic acid) | Citrus fruits (oranges, lemons, limes, grapefruits), potatoes, tomatoes | Essential to function of blood vessels; healing of wounds, and function of connective tissue | Scurvy with hemorrhages into tissues, from the gums, etc. |
| D | Fish livers (cod liver oil), milk, butter, eggs, sunlight | Essential to bone metabolism and normal bone formation, also to calcium and phosphorus metabolism | Rickets with bone deformities (bowlegs, pigeon chest, etc.), convulsions in infants (tetany) |
| Folic acid | Liver, yeast, green vegetables, (lettuce, etc.) | Important in formation of red blood cells | Anemia accompanied by improperly formed red blood cells |
| K | In intestinal tract of healthy persons on normal diet | Necessary for normal blood clotting | Hemorrhage, especially following surgery |

SOURCE: By permission from Otto, Julian, and Tether, *Modern Health*. New York: Holt, Rinehart and Winston, Inc., 1963, p. 313

The recommended dietary allowances are intended to serve as a guide in planning diets for population groups. Variations are to be expected because activity and energy expenditure levels, body weights, and climatic conditions vary considerably.

A much more general but more complex "rule-of-thumb" may be more useful in determining amount and com-

**TABLE 10 2. Need for Mineral Elements**

| | ELEMENTS ESPECIALLY NEEDED | RESULTS OF LACK OF THESE ELEMENTS |
|---|---|---|
| AS BUILDING MATERIALS | | |
| Bones and teeth | Calcium and phosphorus | Stunted growth<br>Weakened or soft bones<br>Malformed or decaying teeth<br>Rickets |
| Hair, nails, and skin | Sulfur | |
| Soft tissues—chiefly muscles | All salts, esp. potassium, phosphorus, sulfur, chlorine | |
| Nervous tissue | All salts, esp phosphorus | |
| Blood | All salts, esp iron, calcium, sodium, phosphorus, copper | Lack of iron or copper results in less than normal amounts of hemoglobin in blood, a condition called nutritional anemia |
| Glandular secretions | Stomach secretions—chlorine<br>Intestinal secretions—sodium<br>Thyroid secretion—iodine | Lack of iodine results in enlargement of thyroid gland—simple goiter |
| AS BODY REGULATORS TO MAINTAIN *NORMAL* | | |
| Exchange of body fluids | All salts | |
| Contractility of muscles<br>Irritability of nerves | All salts, especially balance of calcium with sodium and potassium | |
| Clotting of blood | Calcium | |
| Oxidation processes | Iron and iodine | |
| Neutrality of body | Balance between.<br>Basic elements—sodium, potassium, calcium, magnesium, and iron<br>Acidic elements—phosphorus, sulfur, and chlorine | |

SOURCE By permission from Bogert, Briggs, and Calloway, *Nutrition and Physical Fitness*. Philadelphia W B. Saunders, 1966, p. 132.

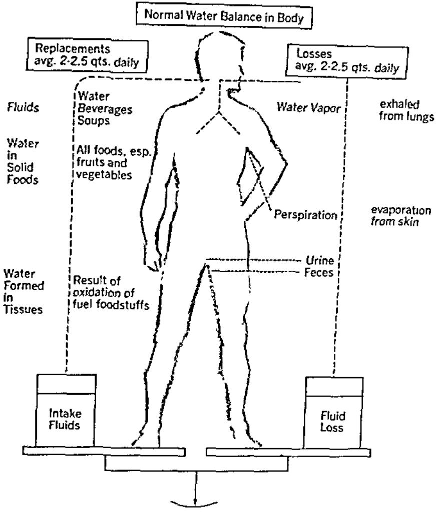



**FIGURE 10.7** Normally the intake and output of water from the body are approximately in balance. If much water is drunk, the volume of urine excreted increases. If water intake is low or the amount lost in perspiration is high (with exercise or in hot weather), the urine will be reduced in volume. By permission from Bogert, Briggs, and Calloway, *Nutrition and Physical Fitness*. Philadelphia: W. B. Saunders Company, 1966, p. 142.

position of the diet for the *healthy* adult. (The established minimal vitamin and mineral requirements should, of course, be met.)

1. Determine the caloric intake necessary, depending on the individual's needs to:

a. maintain body weight (intake equals daily expenditure)

b. gain weight (daily intake exceeds expenditure)

c. *lose weight (expenditure exceeds* intake by at least 500 calories a day *with minimal intake of* 1500 calories a day)

TABLE 10.3 Recommended Dietary Allowances

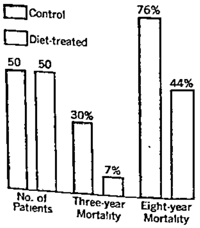
| GROUP | SERVINGS | INCLUDES |
|---|---|---|
| Milk | Some milk daily | Children 3 to 4 cups<br>Teen-agers 4 or more cups<br>Adults 2 or more cups<br>Pregnant women 4 or more cups<br>Nursing mothers 6 or more cups<br>Cheese and ice cream can replace part of the milk. |
| Meat | 2 or more | Beef, veal, pork, lamb, poultry, fish, eggs, with dried beans and peas and nuts as alternates. |
| Vegetable–Fruit | 4 or more | A dark green or deep yellow vegetable important for vitamin A —at least every other day. A citrus fruit or other fruit or vegetable important for vitamin C—daily, other fruits and vegetables including potatoes. |
| Bread–Cereals | 4 or more | Whole grain, enriched, restored. |
| Other food | Normally included in the daily diet | Butter, margarine, sugars, and unenriched grain products serve to provide the caloric and nutrient allowances |

2. Begin by assuring a daily intake of at least one gram of protein per kilogram of body weight (approximately 2.2 pounds equals one kilogram). Make sure that the ten essential amino acids are included. For gaining weight (for example, for growing children) the excess calories per day should probably be protein.

3. No more than 25 to 30 percent of the total calories should be derived from fats (see Figures 10.8 to 10.10), at least 50 percent of these of the unsaturated variety (soft oils and so forth).

4. The remainder should be from the carbohydrates, with the large majority being of the complex type (starches and so forth) rather than being highly puri-

FIGURE 10.8 Effects of low-cholesterol, low-fat diet on mortality of coronary heart disease patients. Adapted from Katz, Stamler, and Pick (294) after Morrison (407).



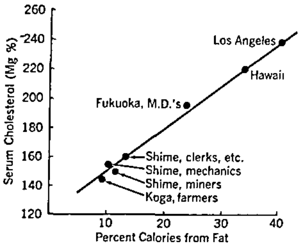



**FIGURE 10.9** Diet and serum cholesterol in 284 clinically healthy Japanese men in seven groups. Age range was 40-49. After Figure 2, Ancel Keys, "Diet and the Epidemiology of Heart Disease," *Journal of the American Medical Association*, 164:1912, 1957. By permission.

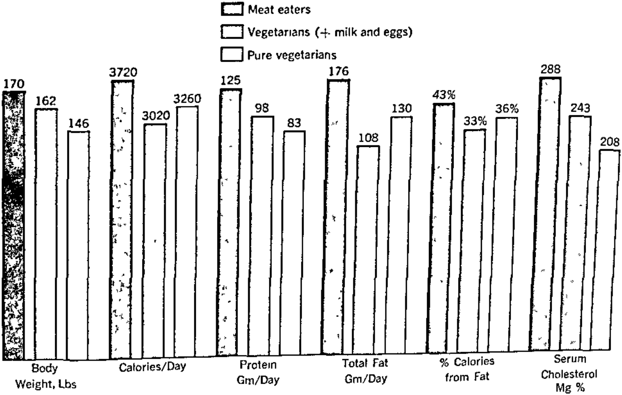



**FIGURE 10.10** Nutritional, body weight, and serum cholesterol differences between meat eaters, lacto-ovo-vegetarians, and vegetarians. Adapted from Katz, Stamler, and Pick (294) after Hardinge and Stare (228).

fied sugars (461) (see Figure 8.42). This should not exceed roughly 50 percent of the total caloric intake.

In connection with this recommended diet, it is interesting to note how the United States of America has changed its food intake habits since 1910 (see Figure 10.11 and Table 10.4).

## When To Eat

Recent research suggests that, for weight maintenance or reduction, it is best to divide the caloric intake fairly evenly over at least three meals a day (165, 166, 171, 278). In our own laboratory, several experiments have shown

TABLE 10.4 Apparent per Capita Consumption of Major Foods, 1910–1960, U.S.A. (in Pounds per Person)

| FOOD | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 |
|---|---|---|---|---|---|---|
| Meats | 146 | 137 | 129 | 142 | 145 | 161 |
| Fish | — | — | 10 | 11 | 12 | 10 |
| Eggs (number) | 306 | 299 | 331 | 319 | 389 | 334 |
| Poultry | — | — | 17 | 17 | 25 | 34 |
| Total milk fat solids | 30 | 29 | 32 | 33 | 29 | 25 |
| Total nonfat milk solids | 35 | 38 | 36 | 38 | 43 | 44 |
| Fluid milk and cream | 315 | 348 | 337 | 331 | 349 | 325 |
| Ice cream (gal) | 2 | 8 | 10 | 11 | 17 | 18 |
| Fats and oils | — | — | — | 46 | 46 | 45 |
| Fruits, fresh | 138 | 145 | 134 | 142 | 107 | 98 |
| Fruits, citrus | 18 | 26 | 31 | 57 | 41 | 33 |
| Apples | 59 | 63 | 42 | 30 | 23 | 20 |
| Fruits, canned | 4 | 9 | 13 | 19 | 22 | 23 |
| Juices, canned | 0.5 | 0.5 | 0.3 | 7 | 13 | 13 |
| Juices, frozen | — | — | 0.5 | 1 | 4 | 9 |
| Fresh vegetables and melons | — | 127 | 145 | 143 | 140 | 132 |
| Canned vegetables | 15 | 19 | 28 | 34 | 42 | 45 |
| Frozen vegetables | — | — | — | 1 | 3 | 10 |
| Potatoes | 198 | 140 | 132 | 123 | 106 | 102 |
| Sugar | 75 | 86 | 110 | 96 | 101 | 98 |
| Grains | | | | | | |
| Corn meal | 51 | 35 | 28 | 22 | 12 | 7 |
| Oat | 3 | 6 | 6 | 4 | 3 | 4 |
| Barley | 4 | 3 | 5 | 1 | 1 | 1 |
| Wheat | 214 | 179 | 171 | 155 | 135 | 118 |
| Beverages | | | | | | |
| Coffee | 9 | 12 | 13 | 16 | 16 | 16 |
| Tea | 1 | 1 | 1 | 1 | 1 | 1 |

SOURCE: Statistical Abstract of the United States (578)

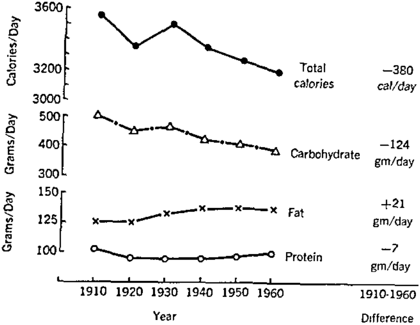
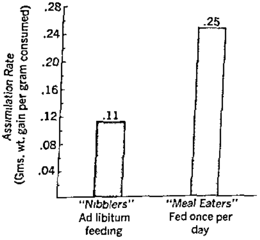



**FIGURE 10.11** *Nutrients available for civilian consumption per person per day in the United States, 1910-1960. Adapted from Statistical Abstract of the United States (578).*

that rats fed only once a day gain more weight per gram of food consumed than those fed ad libitum (see Figure 10.12). It appears that the spreading out of the caloric intake may be just as important as the composition of the diet both in terms of efficiency (377) and prevention of obesity and high blood cholesterol (171). Obesity and high blood cholesterol are, of course, *statistically associated with heart disease.* This concept is discussed further in Chapter 8.

For improved efficiency, meals should be well spaced throughout the day. There is evidence that greater output of work is gained from a five-meal day than from a three-meal day and that eliminating or limiting the composition of breakfast results in decreased work output (377).

**FIGURE 10.12** Comparison of assimilation rate of consumed food in "nibblers" and "meal eaters." Ration of weight gained to food eaten. Number was 16 in each group of male albino rats Data from Johnson and Cooper (278)



There is a widespread belief that stomach cramps are often responsible for drownings and that they are caused by swimming immediately after eating. There is little if any objective evidence that abdominal cramps are a common swimming hazard. Frequently the causes of drowning accidents have been assumed from the position in which bodies have been found. This is, of course, not objective evidence. Furthermore, it has been reported that efforts to discover swimmers who had ever experienced cramps of this type have been almost completely fruitless. Dr. Arthur Steinhaus quotes an unidentified swimming expert on this subject:

> *I have never seen a case of so-called stomach cramps. I am familiar with cramps of thighs and legs. These are generally associated with swimming in cold water or when fatigued. Although I have observed hundreds of thousands of persons, among them participants in Red Cross summer institutes, engaged in recreational and instructional swimming immediately after eating, I have yet to see the first case of drowning or near drowning that could be attributed authentically to swimming at this time. Usually drownings are attributable to carelessness or foolhardiness* (543, *p.* 159).

The late Fred Lanoue (328, p. 153), famed swimming coach at Georgia Tech, reported that of more than 30,000 swimmers with whom he had been associated, not one had ever experienced a stomach cramp.

As a result of reports such as these and in the absence of any objective evidence to the contrary, it has been concluded that the "stomach cramp" danger is largely a mythical one. It is further suggested that if there is danger involved in swimming after eating it would probably result from a feeling of discomfort in breathing. This would probably occur only after an extremely large meal. In such cases it would, of course, be wise to refrain from swimming until such time as complete freedom in breathing is restored.

It is not wise to eat just before or immediately following an activity that involves emotions or nervousness—for example, competitive athletics. This type of activity tends to interfere with the digestive process; however, *mild* exercise, not involving competition or emotions, is not harmful and may even act as an aid to digestion.

## IDEAL BODY WEIGHT

How much should one weigh? Is there over- or underweight? In trying to answer these questions from height-weight tables, caution should be taken in interpreting them (see Tables 10.5 and 10.6). Underweight or overweight as judged by deviations from the tables does not necessarily indicate undernutrition or obesity. An inherited frame size plays an important part in determining one's weight and most height-weight tables are now designed to include three categories of frames: small, medium, and large (see Tables 10.5 and 10.6). The problem is that most people really have no way of knowing into which category they

**TABLE 10.5 Desirable Weights for Men of Ages 25 and Over: Weight in Pounds According to Frame (in Indoor Clothing)**

| HEIGHT (WITH SHOES ON — 1-INCH HEELS) Feet | Inches | SMALL FRAME | MEDIUM FRAME | LARGE FRAME |
|---|---|---|---|---|
| 5 | 2 | 112–120 | 118–129 | 126–141 |
| 5 | 3 | 115–123 | 121–133 | 129–144 |
| 5 | 4 | 118–126 | 124–136 | 132–148 |
| 5 | 5 | 121–129 | 127–139 | 135–152 |
| 5 | 6 | 124–133 | 130–143 | 138–156 |
| 5 | 7 | 128–137 | 134–147 | 142–161 |
| 5 | 8 | 132–141 | 138–152 | 147–166 |
| 5 | 9 | 136–145 | 142–156 | 151–170 |
| 5 | 10 | 140–150 | 146–160 | 155–174 |
| 5 | 11 | 144–154 | 150–165 | 159–179 |
| 6 | 0 | 148–158 | 154–170 | 164–184 |
| 6 | 1 | 152–162 | 158–175 | 168–189 |
| 6 | 2 | 156–167 | 162–180 | 173–194 |
| 6 | 3 | 160–171 | 167–185 | 178–199 |
| 5 | 4 | 164–175 | 172–190 | 182–204 |

SOURCE: Metropolitan Life Insurance Company

**TABLE 10.6 Desirable Weights for Women of Ages 25 and Over: Weight in Pounds According to Frame (in Indoor Clothing)***

| HEIGHT (WITH SHOES ON — 1-INCH HEELS) Feet | Inches | SMALL FRAME | MEDIUM FRAME | LARGE FRAME |
|---|---|---|---|---|
| 4 | 10 | 92– 98 | 96–107 | 104–119 |
| 4 | 11 | 94–101 | 98–110 | 106–122 |
| 5 | 0 | 96–104 | 101–113 | 109–125 |
| 5 | 1 | 99–107 | 104–116 | 112–128 |
| 5 | 2 | 102–110 | 107–119 | 115–131 |
| 5 | 3 | 105–113 | 110–122 | 118–134 |
| 5 | 4 | 108–116 | 113–126 | 121–138 |
| 5 | 5 | 111–119 | 116–130 | 125–142 |
| 5 | 6 | 114–123 | 120–135 | 129–146 |
| 5 | 7 | 118–127 | 124–139 | 133–150 |
| 5 | 8 | 122–131 | 128–143 | 137–154 |
| 5 | 9 | 126–135 | 132–147 | 141–158 |
| 5 | 10 | 130–140 | 136–151 | 145–163 |
| 5 | 11 | 134–144 | 140–155 | 149–168 |
| 6 | 0 | 138–148 | 144–159 | 153–173 |

*For girls between 18 and 25, subtract 1 pound for each year under 25.
SOURCE: Metropolitan Life Insurance Company

**TABLE 10 7 Sample Diet and Activity Recall Record**

| ACTIVITY | TIME | MIN | FACTOR | PRODUCT | FOOD | QUANTITY | | CALORIES | PROTEIN (g) | CHO | CALORIES FROM FAT | SAT FAT | UNSAT FAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Breakfast | 8 00– 8.30 | 30 | .0093 | 279 | Bacon | 3 | Breakfast(B) = 705 | 155 | 8 | 3 | 117 | 37 | 74 |
| Reading | 8 30–10 00 | 90 | .0080 | .720 | Eggs, scrambled | 2 | | 175 | 11 | 8 | 117 | 37 | 71 |
| Walking | 10 00–10 30 | 30 | 0330 | .990 | Orange juice, fresh | 6 oz | | 80 | 1 | 68 | — | — | — |
| Classwork | 10.30–12 00 | 90 | 0110 | 990 | Toast (white) | 1 | | 60 | 2 | 47 | 6 | 1 | 5 |
| Lunch | 12 00–12 30 | 30 | .0093 | .279 | Butter | 1 pat | | 70 | — | — | 70 | 39 | 27 |
| Classwork | 1 00– 4 00 | 180 | 0110 | 1 980 | Milk | 8 oz | | 165 | 9 | 47 | 79 | 44 | 31 |
| Basketball | 4 00– 5 00 | 60 | 0470 | 2 820 | | | | | | | | | |
| Walking | 5 30– 6 00 | 30 | 0330 | .990 | Hamburger | 2 | Lunch(L) = 1180 | 490 | 41 | — | 306 | 146 | 144 |
| Sitting | 6 00– 6 30 | 30 | 0080 | .240 | Bun | 2 | | 240 | 8 | 188 | 24 | 4 | 20 |
| Supper | 6 30– 7 30 | 60 | 0093 | .558 | Potato chips | 10 | | 115 | 1 | 40 | 67 | 16 | 50 |
| Study (writing) | 7 30– 9 30 | 120 | 0120 | 1 440 | Soft drink, cola | 12 oz | | 130 | — | 130 | — | — | — |
| Sleep | 11.00– 8 00 | 540 | .0078 | 4 212 | Ice cream | Avg serv | | 205 | 4 | 82 | 109 | 60 | 43 |
| | (24 hrs = 1440 – 1290) | | | | | | | | | | | | |
| Fill in | | 150 | .0100 | 1 500 | Ham | Avg serv | Supper(S) = 1380 | 290 | 21 | — | 198 | 71 | 117 |
| | (Calories expended/pound) = | | | 16 998 | Boiled potatoes | 2 med | | 130 | 4 | 120 | — | — | — |
| | (Multiplied by weight) × | | | 200 lbs | Peas, frozen | 1/2 cup | | 55 | 5 | 41 | 3 | — | — |
| | | | | 3400 cal | Butter | 3 pats | | 210 | — | — | 210 | 117 | 81 |
| | Caloric intake (K) = | | | 3265 | Rolls | 2 | | 120 | 4 | 94 | 12 | 2 | 10 |
| | difference = | | | –135 cal | Milk | 8 oz | | 165 | 9 | 47 | 79 | 44 | 31 |
| | | | | | Apple pie | 1 pc | | 410 | 4 | 220 | 151 | 50 | 95 |
| | | | | | Totals | | | K = 3265 | P = 128g | C = 1135 | F = 1548 | S = 668 | U = 799 |

% CHO calories = C – K = 34 8%

% Fat calories = F – K = 47 4%

% Fat unsaturated $= \dfrac{U}{S + U} = \dfrac{799}{1467} = 55\ 5\%$

% Cal breakfast $= \dfrac{(B)}{K} = \dfrac{705}{3265} = 21\ 6\%$

% Cal lunch $= \dfrac{(L)}{K} = \dfrac{1180}{3265} = 36\ 1\%$

% Cal. supper $= \dfrac{(S)}{K} = \dfrac{1380}{3265} = 42.3\%$

| | |
|---|---|
| | 128 (intake) |
| Wt (200 pounds) × 45 g/pound = | 90 g (required) |
| | +38 g protein excess |

walking on a treadmill for five minutes while a 185-pound colleague's rate was only 390—exactly one half (281). Furthermore, fitness or skill in the activity also has an effect. The average cost of a standardized treadmill walk in nine men was reduced from a rate of 500 to 420 calories per hour after four weeks in a relatively moderate exercise program (281).

The point is this: Be careful in attempting energy balance calculations. Absolute figures taken from expenditure tables may be quite misleading, and there may even be individual differences in food absorption related

**TABLE 10.8 Approximate Caloric Expenditure for Various Activities**

| CAL/MIN/ LB. OF BODY WT. | ACTIVITY | CAL/HR/ LB OF BODY WT. | CAL/MIN/ LB. OF BODY WT | ACTIVITY | CAL/HR/ LB OF BODY WT. |
|---|---|---|---|---|---|
| .0234 | House painting | 1.40 | .023 | Volleyball | 1.40 |
| .026 | Carpentry | 1.56 | .026 | Playing ping pong | 1.56 |
| .031 | Farming, planting, hoeing, raking | 1.86 | .033 | Calisthenics | 1.98 |
| .039 | Gardening, weeding | 2.34 | .033 | Bicycling on level roads | 1.98 |
| .045 | Pick-and-shovel work | 2.70 | .036 | Golfing | 2.16 |
| .050 | Chopping wood | 3.00 | .046 | Playing tennis | 2.76 |
| .062 | Gardening, digging | 3.72 | .047 | Playing basketball | 2.82 |
| .0078 | Sleeping | 0.47 | .069 | Playing squash | 4.14 |
| .0079 | Resting in bed | 0.47 | .100 | Running long distance | 6.00 |
| .0080 | Sitting, normally | 0.48 | .156 | Sprinting | — |
| .0080 | Sitting, reading | 0.48 | | Swimming | |
| .0089 | Lying, quietly | 0.54 | .032 | Breast stroke 20 yd/min | — |
| .0093 | Sitting, eating | 0.56 | .064 | Breast stroke 40 yd/min | — |
| .0096 | Sitting, playing cards | 0.58 | .026 | Back stroke 25 yd/min | — |
| .0094 | Standing, normally | 0.56 | .056 | Back stroke 40 yd/min | — |
| .011 | Classwork, lecture | 0.66 | .058 | Crawl 45 yd/min | — |
| .012 | Conversing | 0.72 | .071 | Crawl 55 yd/min | — |
| .012 | Sitting, writing | 0.72 | .033 | Walking on level | 1.98 |
| .016 | Standing, light activity | 0.96 | .093 | Running on level (jogging) | 5.60 |
| .020 | Driving a car | 1.20 | .01 | Fill in constant for time unaccounted for (if not completely inactive such as sleeping or resting) | 0.60 |
| .028 | Cleaning windows | 1.68 | | | |
| .024 | Sweeping floors | 1.40 | | | |
| .044 | Walking downstairs | — | | | |
| .116 | Walking upstairs | — | | | |
| .014 | Lecturing | 0.84 | | | |

EXAMPLE. 150-pound man sitting and reading for 60 min = 150 × .0080 × 60 = 72 calories expended, or 1 hr = 150 × .48 × 1 = 72 calories

to, for example, differences in bile available to aid in the digestion of fats (362). One should not be surprised if he does not have success at first. If the intake figures are correct, it is quite possible that there is a need to revise expenditure estimates or to look at the possibility of differences in absorption.

## OVERWEIGHT

It is ironic that while much of the world's population suffers from insufficient food supplies, many people of the United States are suffering from an *overabundance* of certain foods in the diet. The American public's most serious nutritional problem is probably excess weight. It is interesting to pause here and note that Russian studies "show convincingly that rats fed on meager but wholesome food, containing all necessary vitamins, amino acids, and salts, live considerably longer than their controls fed on the usual diet." It is also pointed out that, in these studies, the rats on the restricted diet are more active and "their vital indices correspond to a younger age" (370).

Food provides energy for work and heat. If more work is performed than the daily food intake provides for, stored foods are used. If more food is eaten than can be burned, the excess is stored as fat.

Esthetically speaking, stored fat is not desirable; moreover, excess fatty tissue probably has an adverse influence on health. Obesity in children often exposes them to difficult situations and damaging emotional experiences.

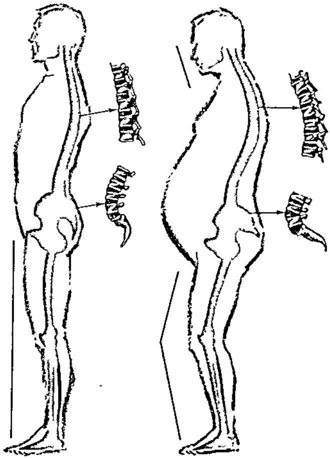


**FIGURE 10.13** Normal posture (left) and posture in obesity By permission from William J. Kerr and John B. Lagen, "The Postural Syndrome Related to Obesity Leading to Postural Emphysema and Cardiorespiratory Failure," *Annals of Internal Medicine*, 10.581, 1936.

Obesity that develops before age 10 or after 16 is difficult to treat, whereas obesity developing just before puberty may be physiologic and is often self-corrective in the next few years. Inactivity often leads to the development and perpetuation of obesity (376).

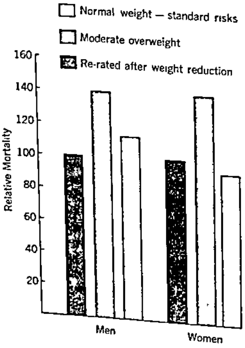
Environment can play an important role in establishing appetite and eating patterns. Children coming from homes

where the mother loves to bake can easily develop an eating pattern that must include desserts. While children are young and active the additional calories are usually burned up, but as this eating pattern continues and their lives become more sedentary the excess calories are stored as fat.

*Overweight* adults are more susceptible than are those of normal weight to arthritis, cancer, cardiovascular disease, diabetes, gall bladder disturbances, hernia, certain forms of liver disease, and other health impairments (118).

As discussed on page 215, obesity is associated with high blood pressure

**FIGURE 10.14** Effect of weight reduction on relative mortality risk. Adapted from Katz, Stamler, and Pick (294) after Shepard and Marks (513).




and arteriosclerotic heart disease. Figure 10.14 presents an interesting picture relating weight and mortality.

## Cause of Overweight and Obesity

We have noted with a great deal of interest an experimental study on overeating reported by Strong, Shirling, and Passmore (552). Figure 10.15 portrays the calculated results of four days' overeating in sixteen male and female subjects of varying body weights and builds. These data provide evidence that, at least during periods of short-term excess calorie intake, neither the thin nor the obese person "adapts" to the calorie excess by rejecting part of the excess or by burning up a significant proportion of the excess. Fecal loss is not increased nor is BMR increased any more than can be accounted for by the SDA (see page 320). The amount of weight was dependent mostly on variability in water retention. On the average, 9 percent of the excess was stored as protein, 35 percent as fat, and 36 percent as carbohydrate, which means only 20 percent was metabolized and lost via excretion.

A most important phenomenon related to metabolism and weight control is seldom recognized. Changes in activity and the somewhat typical decline in BMR associated with aging can combine to cause unbelievable weight gains.

As one can see by studying Figures 10.16 and 10.17, discontinuance of an activity without a parallel reduction in caloric intake can very subtly but surely cause a substantial deposi-

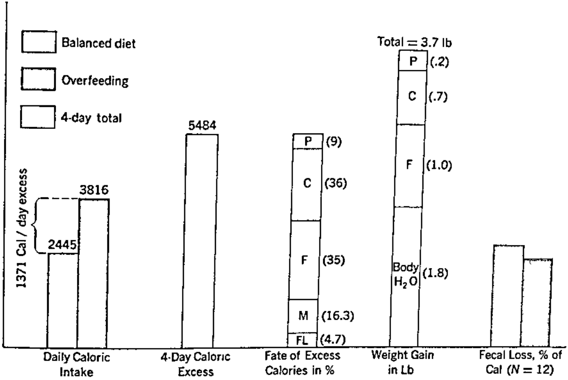



**FIGURE 10.15** Results of four days' overfeeding in 16 subjects. Data from Strong, Shirling, and Passmore (552).

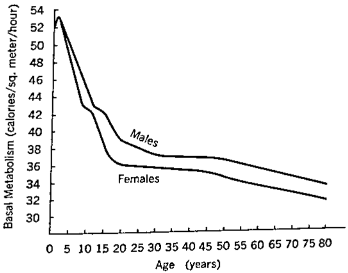



**FIGURE 10.16** Basal metabolic rate by sex and age. By permission from A. C Guyton, *Function of the Human Body*. Philadelphia: W. B. Saunders Company, 1964, p. 361.

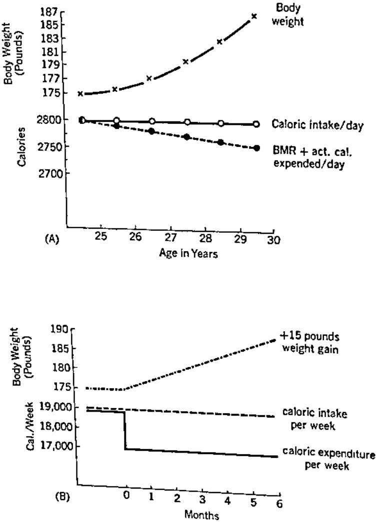



**FIGURE 10.17** (A) Theoretical weight gain from normal fall in BMR from age 25-30. Average fall at this age is only 8 calories per day, but this would cause a weight gain of 12 pounds over five years (even if activities stayed same) if intake was not reduced. Assume 3500 calories = 1 pound body weight. (B) Theoretical six month weight gain resulting from cessation of one hour recreational basketball five days per week and continuation of same caloric intake. Assume 3500 calories = 1 pound body weight.

tion of excess fat. In the example cited in Figure 10.17 the typical 8 percent drop in BMR seen between ages 25 and 30 as illustrated in Figure 10.16 could, by itself, account for a twelve-pound weight gain in five years if intake were not decreased.

The examples are obviously oversimplified. However, the principle is of extreme importance and practicality and should be kept well in mind. There is considerable evidence that this is exactly the sort of thing that happens to many overweight individuals, in-

cluding former college letter-winners (395) (see Figure 10.18).

Combining our classification system with others proposed in the literature, we have presented what seems to be a logical and understandable means of classifying the causes of obesity (see Table 10.9). The current medical view is that only a very small percentage of obese persons can legitimately attribute their problem to any endogenous cause. In other words, metabolic obesity has not been convincingly demonstrated in the human being. It is important to point out that, *no matter what the cause, one cannot lose weight unless caloric expenditure exceeds caloric intake! And, conversely, when intake exceeds expenditure, one will gain weight!*

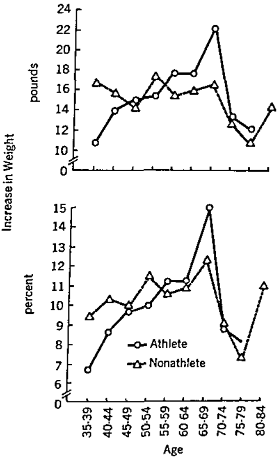



**FIGURE 10.18** After 45 years of age, the weight gain of athletes is greater than that of nonathletes. By permission from Montoye and others (395)

**TABLE 10.9 Causes of Obesity**

| | PSYCHOLOGIC | PHYSIOLOGIC |
|---|---|---|
| EXOGENOUS: (From "without") | Neurotic overeating<br>Compulsive eating, boredom, and so on<br><br>Non-neurotic overeating (cultural dietary pattern) | Decreased Energy Expenditure<br>Forced inactivity or immobilization<br>Voluntary inactivity |
| ENDOGENOUS: (From "within") | | Metabolic Obesity<br>Enzyme disorder<br>Endocrine disorder<br>Hypothalamic disorder |

## EFFERENT CONCEPTS

We shall now take a look at the role that regular exercise plays in digestion, the relationship of nutritional principles to exercise and fitness, and, finally, the very important relationships among food intake, regular exercise, and weight control.

### REGULAR EXERCISE, DIGESTION, AND METABOLISM

*Does regular exercise increase the size and functional capacity of the digestive organs?* There is no support for this claim; in fact, it appears that changes in size and function do *not* occur as a result of training.

*Does regular exercise improve digestion and elimination?* There is no evidence to support the claim that regular exercise improves actual digestion of foodstuffs. There is some clinical evidence that complete lack of activity in bed-ridden patients often leads to constipation and the medical texts state that exercise is important for "regularity," but there is no experimental evidence to corroborate the view based on the clinical experiences.

*Does regular exercise increase the basal metabolic rate (BMR)?* Obviously exercise per se increases metabolism, but there is great confusion concerning the effect of training on the basal metabolic rate. The confusion is due, in part, to the difficulty in recording the true BMR. At this time, the best answer appears to be that, in general, regular exercise has no appreciable effect on BMR.

*Does regular exercise eliminate body fat?* This question will be dealt with later in this chapter. The logical conclusion is that exercise *can* reduce body fat stores provided caloric intake does not consistently exceed caloric expenditures.

*Does regular exercise add weight?* Again, the complexity of the several factors involved makes it difficult to give a definite answer. If muscle hypertrophy occurs and weight gain is not compensated for by decreased fat stores, appropriate muscle training can increase weight. Obviously, if exercise increases the appetite and this increased appetite is appeased regularly, it is even possible that one might gain weight in this manner. This is not recommended as a means of gaining weight except, perhaps, in an extremely undernourished or thin person. Unless one is extremely thin, it is questionable whether he should even be concerned about "putting on weight," especially if such an increase is primarily an attempt to gain social acceptance by looking more "prosperous"!

### EXERCISE, FITNESS, AND NUTRITION

Although a great deal has been written about nutrition and athletic performance and exercise, we see no particular advantage in reproducing such information here. Excellent reviews have been published by Mayer and Bullen (377) and VanItallie, Sinisterra, and Stare (585). The sum and substance of the research is that the great majority of the theories and "fads" do not stand

up under scientific inquiry. It can be stated with some considerable degree of confidence that:

1. A normal, well-balanced diet (as described on page 329), increased in keeping with the demands of the increased daily physical activity, is adequate and cannot be improved on by supplementation with any reasonable expectation that performance or fitness will be enhanced.
2. Because glucose as a fuel is more efficient than fat in terms of oxygen needed, there may be some benefit from slightly increasing carbohydrate intake (377, 585), but not at the expense of protein (see entry 3) and not to excess proportions (probably should never exceed 50 to 55 percent of total caloric intake).
3. Protein intake may need to be increased above the minimum recommendation if growth is still occurring or if muscle mass is to be increased (377, 585).
4. Vitamin and mineral supplements have not proven to be of value unless the person has a deficiency. In other words, *excess* vitamin intake in the normal individual does not promote greater physical efficiency. For example, Vitamin $B_{12}$ would not be expected to improve the red blood cell count and the hemoglobin concentration in a man with a normal 14.5 g% hemoglobin concentration (394). Thus, $O_2$ delivery would certainly not be enhanced by excess Vitamin $B_{12}$ intake.

In summary, the best evidence available supports a cautious and conservative viewpoint. The optimum diet for an athlete or any person exercising regularly "is not different in any major respect from that which would be recommended to any normal individual. The diet should be adequate for maintenance, for growth if the individual is still growing, for increase in muscle mass if need be and for fulfilling of energy requirements . . ." (377). On the other hand, "there is no doubt whatever that performance can be significantly impaired when a less than adequate diet is consumed" (585).

## EXERCISE AND WEIGHT CONTROL

(The term "weight control" is used here in its most inclusive sense; it includes the aspects of prevention of weight gain and weight maintenance as well as weight reduction.) It is important to bear in mind that obesity is synonymous with excess body fat, not with "overweight," which may or may not include excess body fat. With respect to the weight reduction aspect of weight control, our discussion is directed toward the condition of slight to moderate obesity and not to the more resistant types of gross, refractory obesity. When discussing exercise and weight control, we assume that exercise is to be combined with a balanced diet, a diet that is balanced with caloric expenditure for prevention of weight gain or maintenance of weight and that is reduced daily by 500 to 1000 calories for weight loss. It is important to remember that, before embarking on a weight reduction program, the degree of obe-

sity, if any, must be properly determined; this means one should use at least the skin-fold method for estimating percent of body fat. For example, a forty-year-old man may be 25 pounds "overweight" according to height-weight tables; if his body is 20 percent fat, because normal for even a twenty-one-year-old male is about 14 percent, he is carrying only about 6 percent of his weight as excess fat; this means only 12.6 pounds to be lost, not 25!

There are apparently three ways in which regular exercise can contribute to weight control. The best known is, of course, an increase in caloric expenditure. Less recognized, but possibly of even greater importance, are: (1) a positive effect on the body's "appestat," which balances food intake with actual need, and (2) promotion of a more optimal body composition (that is, less fat) for a given body weight. There is also greater permanence of weight loss when regular exercise is included as an integral part of a weight reduction program.

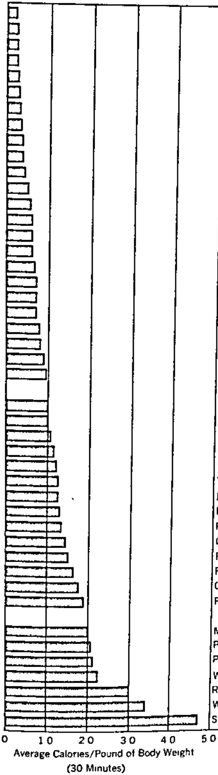
### Caloric Expenditure

In spite of the poor applicability of caloric expenditure tables to individual situations, such tables do reveal the high energy cost of exercise above the basal rate (see Figure 10.19). It has been estimated that a man can expend the equivalent of sixteen pounds a year through a daily half hour of handball or squash (376). Those who argue against exercise as a means of losing weight cite from the energy tables that it takes seven hours of chopping wood to lose one pound. They fail to state that one half hour a day will do the same thing in a two-week period as seven hours accomplish all at once. In a year of daily one-half-hour periods, twenty-six pounds can be lost. Therefore, in looking at the hours required to lose weight by exercise, one should think in terms of short daily exercise periods over long periods of time.

There is an abundance of evidence to support the conclusion that regular exercise can reduce body fat; however, exercise is not the only activity that controls weight loss. To reduce fat it is necessary to expend more calories than are consumed. Also, certain individuals may have a hormone or metabolism problem that prevents or limits the amount of fat that can be lost through exercise. Recently there has been advanced a possible explanation for some people's inability to lose weight even though they do not overeat or under-exercise. There is a possibility of a temperature control abnormality that makes some persons burn resources other than fat in order to maintain warmth. To maintain body temperature, such persons apparently depend more upon fat's insulating quality than on metabolic processes (378).

Shade and others (509) recently compared the effects of six weeks of "generalized" and of "spot" reducing in

**FIGURE 10.19** Approximate energy expenditure in various physical activities and "inactivities." Comparison-ranking in calories per pound per 30 minutes and examples calculated for a 120-pound and a 160-pound person. Data from a summary by C. F. Consolazio, R. E. Johnson, and L. J. Pecora, *Physiological Measurements of Metabolic Functions in Man*. New York: McGraw-Hill, Inc., 1963, pp. 330-332.




| Activity | 120 #♀ | 160 #♂ |
|---|---|---|
| Sleeping | 28 | 38 |
| Resting in bed | 28 | 38 |
| Sitting normally | 29 | 38 |
| Sitting reading | 29 | 38 |
| Lying quietly | 32 | 43 |
| Sitting eating | 33 | 44 |
| Standing normally | 34 | 45 |
| Classwork, lecture | 40 | 53 |
| Sitting, writing | 44 | 59 |
| Conversing | 44 | 59 |
| Standing, light activity | 58 | 78 |
| Driving a car | 72 | 96 |
| Volleyball | 83 | 110 |
| Walking on level (2.27 mph) | 84 | 112 |
| House painting | – | 112 |
| Pitching horseshoes | 85 | 113 |
| Sweeping floors | 88 | – |
| Carpentry | – | 123 |
| Playing ping pong | 93 | 124 |
| Pleasure swimming (back stroke, 25 yd/min) | 93 | 124 |
| Cleaning windows | 99 | – |
| Ironing clothes | 103 | – |
| Farming, planting, hoeing, raking | – | 150 |
| Pleasure swimming (breast stroke, 20 yd/min) | 115 | 154 |
| Calisthenics | 120 | 160 |
| Bicycling on level roads | 120 | 160 |
| Golfing | 130 | 173 |
| Gardening, weeding | 141 | 188 |
| Walking on level (4.47 mph) | 159 | 212 |
| Walking downstairs | 160 | 213 |
| Pick and shovel work | – | 214 |
| Playing tennis | 166 | 221 |
| Playing basketball | 169 | 225 |
| Chopping wood | – | 240 |
| Pleasure swimming (back stroke, 40 yd/min) | 200 | 267 |
| Pleasure swimming (crawl, 45 yd/min) | 209 | 284 |
| Gardening, digging | – | 298 |
| Pleasure swimming (breast stroke, 40 yd/min) | 231 | 306 |
| Mountain climbing | 241 | 321 |
| Playing squash | – | 332 |
| Pleasure swimming (crawl, 55 yd/min) | 255 | 340 |
| Walking on level (5.80 mph) | 273 | 364 |
| Running, long distance | 361 | 481 |
| Walking upstairs | 416 | 555 |
| Sprinting | 561 | 748 |

Average Calories
(30 Minutes)

overweight college women. Their concentration was on the hip and abdominal regions. It was found that the mean weight loss was minimal but that the waist, hip, and thigh measurements were reduced significantly by both programs. The authors concluded that "a reduction in body segments was found where fat accumulations had been most conspicuous." There is further evidence that isotonic and isometric exercises can effect small but significant "spot" reductions (392, 582) and that during general weight loss, fat is removed from those areas having the greatest initial deposit (203). Conflicting evidence, however, suggests that "spot" reducing is not effective in accomplishing its goal (95, 475). In summary, it appears safe to say that "spot" reducing (exercising the area concerned) *may* be effective but probably no more so than general, "nonspot" exercise of equal intensity and duration.

Mayer (376) presents evidence that showed that inactivity was of greater importance than overeating in the development of obesity. The high school girls involved in this study attended summer camp every year and lost weight in spite of the increased food intake because they were involved in a program of strenuous activity.

Mann and others (366) examined the motivational aspect of exercise in weight control programs and concluded from the comments of their subjects that "although the first few days of physical training produced discomforts and fatigue, the men soon experienced

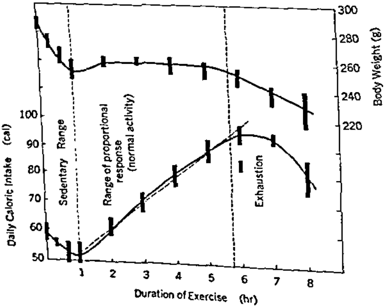



**FIGURE 10.20** Voluntary calorie intake and body weight as functions of exercise in normal rats. By permission from The Athletic Institute and Mayer (374).

a sense of well-being and accomplishment that they considered adequate compensation for their troubles." The men in this program also experienced a "continual loss of fat despite an increase in food intake."

## Regular Exercise and the "Appestat"

Although the exact mechanisms are not as yet clearly understood, it has been well established that the center for control of food intake is located in the hypothalamus. There is an appetite center, the stimulation of which causes one to want to eat, and a satiety center, which, when stimulated, leads to the reduction or complete extinction of the desire to eat. Together, these centers are often referred to as the "appestat" because they operate in much the same way that a thermostat controls temperature. It is fairly well established that the stimulus to these centers, at least the "appetite center," is in some way related to blood glucose level, although the exact mechanism is not known.

Mayer (375) experimented with the frequent misconception that an increase in physical activity always causes an increase in appetite and food intake that equals, or is greater in energy value than, that of the energy of the exercise. Animal experiments and human population studies provide evidence that such a constant relationship does *not* exist. There appears to be an actual increase in voluntary food intake under very sedentary conditions, which, of course, leads to increased

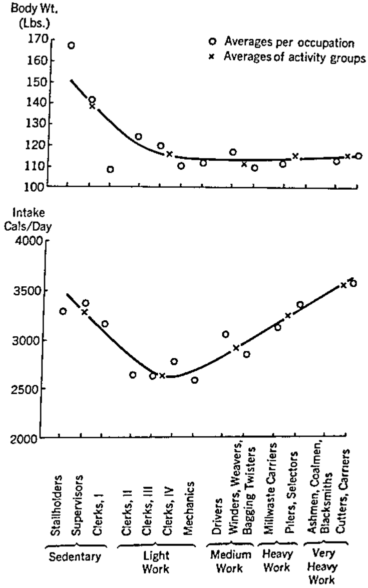



**FIGURE 10.21** Body weight and caloric intake as a function of physical activity. By permission from the Athletic Institute and Mayer (374)

body weight (see Figures 10.20 and 10.21). With a normal daily work output or exercise, intake tends to be proportional to output, and weight remains

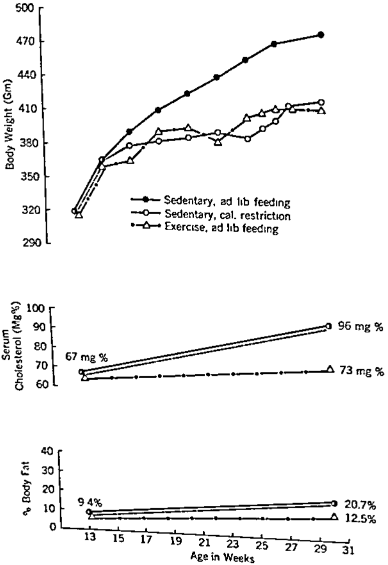



**FIGURE 10.22** Comparative effects of fifteen weeks of daily swimming and caloric restriction on body weight, serum cholesterol, and percent body fat in growing male albino rats. Caloric restriction was designed to maintain body weight comparable to that of the exercise animals. Adapted from Jones and others (288)

constant (Figure 10.20). In the animal studies, exhausting daily exercise led to reduced food intake and weight loss, while less-than-normal amounts of daily exercise caused greater food intake than necessary and a subsequent increase in body weight (see Figure 10.21).

This work has led to a hypothesis that an adequate amount of daily physi-

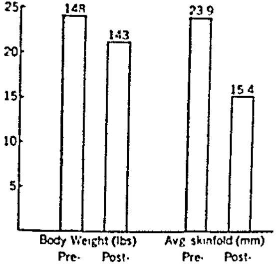



**FIGURE 10.23** Effects of six weeks' moderate exercise program (about 500 calories per day treadmill walking and jogging, 6 days per week) on body weight and average skin fold fat measurement, no diet control required N = 11 overweight college women. Data from Moody, Kollias, and Buskirk (398).

cal activity renders the "appestat" more effective, that is, in some way causes it to more closely control appetite and/or intake in keeping with the actual caloric need so that excess food intake does not occur. The evidence presented establishes an adequate base for such a hypothesis.

### Exercise and Body Composition

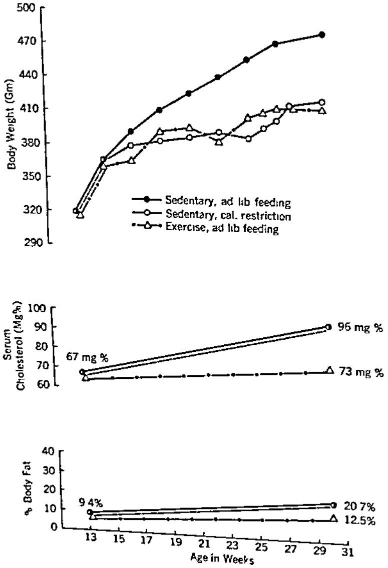
Experiments utilizing animals substantiate the contention that weight loss through exercise is more permanent than loss through caloric restrictions (374). Exercise, even with ad libitum feeding, helps control body weight and, perhaps of even greater importance, controls deposition of body fat, (see Figures 10.22 and 10.23). How does Figure 10.22 provide evidence that body weight and body fat deposition can be controlled by a regular exercise program?

There is evidence that, in response to sympathetic stimulation, there is a greater release of free fatty acids from the adipose tissue of the trained organism than the untrained (443). Furthermore, these free fatty acids, once released, are utilized in response to exercise demands for energy so that they are not restored in fat cells (233). It is also known that exercise following a high fatty meal significantly reduces the level of lipids circulating in the blood, and this also may prevent excess fat deposition.

### Summary: Exercise and Weight Control

Exercise, *combined with sensible food intake*, appears to be the most effective, most natural, and probably the safest method of weight control, especially for those who are only moderately overweight. We hypothesize that this is so, at least in part, because exercise and moderate caloric restriction are more *natural* than synthetic and unnatural schemes such as starvation, liquid diets, and drugs. It is our opinion that these methods all involve or produce physiological changes that cannot be maintained indefinitely and, when removed, have in no way "re-educated" the systems of the body. Thus, they are usually doomed to failure in terms of permanent weight loss.

The amount of daily exercise necessary to provide weight maintenance benefits is dependent upon occupa-

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# Principles of Modern Physical Education, Health, and Recreation

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Holt, Rinehart and Winston, Inc.

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# Preface

Our purpose in writing this book has been to provide for students planning careers in health, physical education, or recreation an introduction both to the scientific core of information about human physical activity and health-related behavior and to the philosophy, procedures, and purposes that we consider relevant for professional experience in the disciplines these students have elected to follow. We have wanted our book to serve the needs of teachers and students who are seriously involved with the very foundations of health, physical education, and recreation.

In preparing the text and assembling its supporting data and demonstrations we have been mindful of the changes occurring in education as the result of world-wide social and political turmoil, changes that have affected the professions of physical education, health education, and recreation just as profoundly as they have all other aspects of modern life.

Like all of today's college students, majors in physical education, health, and recreation reflect the strengthening of academic standards throughout the school system. They also exhibit the increased sophistication characteristic of earlier physical and social maturity. Although the complexities of modern life have multiplied the pressures placed upon them, there is little doubt that young people are better prepared than ever before to cope with the problems left to them by preceeding generations.

Today's students come to college not only academically well grounded, but also philosophically committed to idealistic goals. It is now up to the colleges and universities to give these eager young recruits the modern weapons and training they will need if they are to be successful in attacking the crucial problems they will have to face. It is increasingly clear that their success (and the survival of their professions) depends upon their ability to establish themselves in the minds of the public as *knowledgeable experts* in matters of human physical activity and health-related information and behavior.

We believe that if students are to develop an adequate expertise in their profession, they must first develop a healthy self-respect based upon pride in their *potential* professional contribution. The fostering of this desirable self-image can best be facilitated through early exposure to the true *substance* of the profession. In expressing this philosophy, we have wanted:

1. To introduce the student to his chosen profession by indicating not only what his profession is, but also what it can become.
2. To provide a practical handbook of important principles and a useful source of documented information for the use of the student throughout his preparatory training as well as for the graduate on the job.
3. To establish an integrating element that could function to help the student perceive the relationships among the many courses he will encounter during his professional training.

As a means of organizing some of the ideas contained in this book we have utilized two terms borrowed from the field of neurology. The expression EFFERENT CONCEPTS has been used to identify those ideas dealing with the effects that physical activity and health-related behavior have upon man's biological function, his social conduct, his philosophy, his art, and his culture in general. Conversely, AFFERENT CONCEPTS refer to those ideas that are concerned with how man's physical makeup, his environment, his philosophy, and his culture act to influence, modify, or direct human physical activity and health-related behavior.

As a further attempt to aid students in understanding the material presented, an extensive glossary is included. As each technical term is introduced it appears in boldface, indicating that a definition can be found in the glossary.

So as to distinguish the present effort from the earlier book entitled *Physical Education: A Problem-Solving Approach to Health and Fitness* (Holt, Rinehart and Winston, Inc., 1966), which resulted from a collaboration

with our colleagues Donald Stolberg and Maryellen Schaefer, we should like to emphasize that the 1966 work was written as a text for a new type of combined health and physical education course, one directed more specifically to students not concentrating professionally in health, physical education, and recreation. It was inspired by the idea that today's more mature, intelligent college student deserves to be given the opportunity to study and evaluate for himself the available evidence concerning human physical activity and behavior related to health and fitness.

Many people agreed that this kind of information is valuable for the general student but pointed out that it is of even greater importance for the student preparing to work professionally in health, physical education, and recreation. The obvious objection to the use of the first book for majors has been, however, that it is addressed to a different audience and fails to consider several topics of particular importance to professional students.

Thus, in this book, which is designed for majors, we have deliberately retained significant portions of the scientific content from the 1966 volume and even expanded them considerably into the fabric of the preponderance of new material making up the present text.

We would like to express our appreciation to the many fine people on our own faculty and to those at other institutions who have contributed so much to the genesis of the ideas expressed in this book. Dr. Donald Stolberg has been a particularly stimulating co-worker, and many of his ideas have found their way into this text. We are grateful to several other dedicated professionals whose imaginative work with the introductory majors' course at the University of Toledo has contributed in many ways to our writing of this book. Dr. Harriett Williams, Dr. John Drowatzky, Dr. Jack Schendel, Dr. John Burt, Dr. Jan Broekhoff, and George Gilmore have all made valuable contributions to the philosophy and content of our program at this level.

Our thanks are also extended to Dr. Marguerite Clifton of Purdue University, Dr. Marvin Eyler of the University of Maryland, and Dr. John Cooper of Indiana University, whose many sound criticisms and suggestions for changes in our manuscript have contributed to its substantial improvement.

To Dan Wheeler, of Holt, Rinehart and Winston, we express our appreciation for his enthusiastic encouragement and knowledgeable advice. We would also like to thank Jeanette Ninas Johnson for her advice, patience, and very real assistance in putting this book together.

Finally, we are grateful to our wives, June Updyke and Ann Johnson, for their loyal support, encouragement, and frequent unselfish assistance in this undertaking.

W. F. U.
P. B. J.

*Toledo, Ohio*
*October 1969*

# Contents

# Introduction

Times are changing rapidly. The ever increasing complexity of society demands that we expand our understanding of man and his world if we hope to survive as individuals and as civilized nations. At the same time that pleas for increased breadth of knowledge are being raised, there arises an insistence upon increased professional and technical specialization. The beleaguered student is caught in the middle.

Today's college student, whatever his major field of interest, is expected to master facts and concepts that will give him far greater expertise upon graduation than has been possessed by preceding generations. In becoming an expert, however, the student has found it impossible to pursue as wide a variety of interests as once was possible.

Few people would deny that physical education, health education, and recreational leadership have become distinct and separate professional specialties. There is simply too much of a specialized nature within each field to expect one individual to become adequately prepared in more than one of them in four years. Recognition of this fact has led to the establishment of separate curricula for the preparation of professional workers in each of these areas.

It is not surprising to discover that these curricula contain certain very important common elements, since the three professions share several of the same important objectives. All three professions, for example, are directly concerned with helping man to understand himself and his biological and psychosocial needs. All three are devoted to fostering habits and techniques that will serve not only to help preserve man's health but also to enable him to achieve a full, satisfying life.

The purpose of this book is to provide students with a summary of concepts and principles important to health educators, physical educators, and recreation leaders alike. This is not meant to imply, however, that every concept and principle discussed in the text is considered equally important to each of the professions. Neither is it assumed that all important concepts and principles have been covered, or that judgments made concerning the placement of emphasis are infallible.

We do believe that each chapter in some way provides a substantial portion of the general foundation that must undergird the more specific knowledge and skills of persons embarking on a career in health, physical education, or recreation, and that there is no concept or principle presented that does not hold significance for at least one (if not all) of these professions.

Chapter 17 (Concepts Underlying Special Programs) provides an example of material that is not of equal concern to recreation specialists, to health educators, and to physical educators. While only members of the latter group would be expected to become actively involved in physical activity programs for the atypical child in school, health educators must certainly be aware of the need for such programs and should be intimately concerned with fostering sound philosophies of physical education and recreation for atypical persons as an integral part of the total health education program. Recreation leaders will be increasingly called upon by communities to provide facilities and programs for handicapped youngsters and adults; knowledge of appropriate opportunities, as well as understanding of the limitations imposed by various conditions is essential to the provision of meaningful programs.

Other examples of mutual concern are provided in the brief sections dealing with diseases and disorders of the various systems, and those related to exercise concepts. In the case of diseases and disorders, awareness of these matters may be of pratical significance to the practicing physical educator and recreation specialist even though knowledge of such disorders may be of more direct concern to the health educator. In the second instance (exercise concepts), physical educators will regard concepts pertaining to physical activity as being of paramount importance. The potential health benefits and dangers of various kinds of exercise and physical activity will also be of more than passing interest to the health educator. The recreation leader will make considerable use of such infor-

mation in planning sound, effective programs to meet the leisure needs of the community.

As a summary of principles and a review of important concepts, it is apparent that this book is intended to go beyond serving as an introduction to the professions involved. It is hoped that as you progress through your academic programs, its pages will provide practical assistance in the development of projects and that its many references will serve to give initial direction in the search for further information for papers and presentations. When you near completion of your training, we hope this book will assist you in integrating the detailed and widely divergent aspects of your preparation. And as you begin your professional career, you will find it useful as a review of pertinent ideas and important professional responsibilities and objectives.

Because it is meant to be more than an introductory text, we have included brief sections dealing with procedures and programs. The chapters in Part IV (for example, Essential Emergency Procedures, and Selected Issues) are intended to provide some exposure to these less conceptual but nonetheless basic concerns of the true professional.

It is hoped that this book and the philosophy out of which it has developed will help to identify and strengthen the common goals of physical education, health education, and recreation leadership in order that through their separate, unique contributions these professions may fully achieve their potential for the improvement of man and society.


THE BLADE, TOLEDO, OHIO,
Rewarding Experience
Alcindor Working With Underprivileged Youngsters

# PART I

# Essential Backgrounds

# The Prospective Professional

## Chapter 1

### VITAL QUESTIONS

"Why am I here?" "Why have I chosen a career in physical education—or health—or recreation?" These are questions that each person should ask himself early in his educational career.

There are, of course, any number of possible answers to such questions. However, the nature of these answers may be of vital importance to you and to your profession as well.

Some categories into which typical answers fall are:

1. The desire to pursue personal interests and aspirations; to do something one enjoys.
2. The desire to influence the behavior of others; to achieve acclaim or status.
3. The desire to be of service to others who need assistance.

It is obvious that one's motives might involve all of these desires. It is equally possible, however, that a given individual might enter a profession primarily motivated by one of them. It is conceivable, for example, that one might choose to become

LEW ALCINDOR
*Finds youth stimulating*

# Rewarding Experience

★ ★ ★ ★ ★ ★ ★ ★ ★

## Alcindor Working With Underprivileged Youngsters

NEW YORK (AP)—Lew Alcindor, who could now be getting ready to lead the U S. basketball team in the Olympics, is working instead with the underprivileged youngsters of New York.

"I don't know of anything I've done yet that's been more rewarding," he says "We know what we've done has worked. It's been that good. It's wonderful."

This is the same man who not long ago said of his decision not to try out for the Olympic basketball team:

"We have a racist nation and my decision not to go for the Olympics is my way of getting the message across."

Alcindor, the 7-foot plus center of UCLA's **collegiate** champions and already considered one of the greatest of modern basketball players, was a cinch to make the Olympic team.

He is now part of Operation Sports Rescue along with other famous athletes. Teams each headed by an athlete talk to youngsters in small groups.

"Young people idolize athletes," says LeRoy Wilkins, director of the project. "If you can get athletes to say the same thing that religious leaders and educators are saying, they'll listen."

The objectives of Operation Sports Rescue are to instill self-pride in youngsters of the street, to impress on them the value of remaining in school, to underscore the value of independence by acquiring marketable skills, and to encourage youngsters to take an active part in community affairs.

Among the athletes working on the project in addition to Alcindor are Emmette Bryant of the Boston Celtics, Ron Blye of the New York Giants, Tom Hoover of the Houston Mavericks, Bobby Hunter of the Harlem Globetrotters, Carlos Ortiz and Jose Torres, the boxers, Oscar Robertson of the Cincinnati Royals, and Walt Bellamy of the New York Knicks.

"Alcindor has worked almost as much as all the rest put together," said one of the project officials.

Operation Sports Rescue is sponsored by the Mayor's Urban Task Force and financed by the Bristol Myers Co

FIGURE 1.1 As they become mature, most great athletes become interested in identifying with a "cause" that is greater than self. (Copyright AP; photo, World Wide Photos.)

a health educator because he loves biology or immunology. A love of history might lead another to become a history teacher. A successful high school athlete might choose to enter physical education because he loves sports competition.

The question is, have we chosen this profession because we wish to prolong pleasant experiences in our own lives, or is it that we wish to extend to others the benefits of enjoying for themselves the kinds of experiences we have found meaningful and pleasurable?

Maturity brings changes in philosophy and objectives. It has been said of the typical athlete that when he is young, he wants to be *good*; as he grows older, he wants to be good for *something*. This increasing awareness of the influence that he can have on others through his athletic achievements can lead him in many different directions. Figure 1.1 illustrates the fact that many people who have achieved athletic fame find even greater rewards in forgoing the pursuit of further public acclaim in favor of giving of themselves to others who really need help.

It is doubtful that maturity can be gained by any means other than personal experience. Therefore, the only real justification for pointing out the matters discussed in this chapter is that responsible decisions (if and when they are made) depend upon the avail-

ability of accurate information. On the other hand, if one is to really profit from his educational experiences, he must approach them with a sense of perspective that makes the various courses take on meaning.

At the very beginning of a career it is important to have a serious talk with oneself. It is important to make some definite decisions now (painful though the process may be) about what your real goals in life are. In making these decisions you are really spelling out your philosophy of life. Do you wish to serve others or to be served? Are you anxious to become a coach or teacher or recreation leader in order to be in a strong position to exert an influence in the lives of youngsters, or does this kind of life appeal to you because of the opportunity it gives you to stay in the environment you love? Steinhaus has said that the person who is interested in getting the most dollars does not have the instincts of a teacher (543, p. 256). This does not mean the teacher should not expect fair remuneration for his expensive training and important work. It does mean that if his goal is the gathering of material goods, he does not really have the capacity for putting other people's welfare ahead of his own.

At this point it should be pointed out that no good coach or teacher is entirely unselfish in his motivation. Of course he is fond of the subject he is teaching. Of course he loves the excitement of hard fought contests. But he recognizes that these experiences must be directed toward meeting the needs of the youngsters rather than meeting his own needs. In other words, the truly *professional* person recognizes that his primary responsibility is the improvement and nurture of the student; the

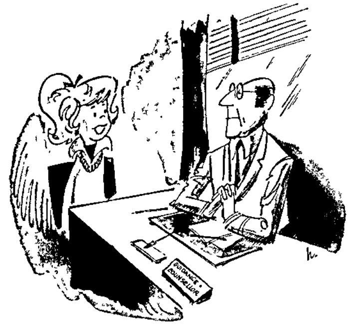


FIGURE 1.2 "Maybe I ought to become a surgeon . . I've always enjoyed cutting and stitching"

professional's own enjoyment and even his professional advancement must be secondary considerations. And certainly neither his enjoyment nor his advancement are ever to be attained at the expense of his students.

In learning to subjugate one's own selfish interests to the best interests of others, many people have found unexpected rewards. No one would deny the thrill to be gained from putting a team of talented performers together and guiding them step by step to victory. Even more gratifying, however, can be the experience of developing the capacity to analyze the subtleties in complex performance and then to creatively utilize this knowledge in producing performers when there were apparently no performers. Anyone can slavishly initiate the systems of others, but what could be more soul satisfying than being the originator of a concept, system, or idea? Anyone should be able to win with good material, but what can be said of the man who can win with players who began as only mediocre performers? And what of the person who uses his influence to expand the creative imagination of an "ordinary" child? That man has the qualities of a *teacher*!

As soon as one begins to direct his thinking in terms of his profession as a service to others, it becomes obvious that the number of youngsters he can help is much larger than he may have realized. Although interscholastic athletics can directly involve a few elite performers, all of the students in a school system profit from a well-conceived program of physical education. Because the life of a normal child is intimately bound up with physical activity, physical educators, recreation leaders, and health educators take advantage of every opportunity to utilize natural urges and desires in achieving a variety of worthwhile educational objectives. However, this must not be understood to mean that such objectives will automatically be achieved. We will have a great deal to say later on about the necessity for careful planning and preparation, if *any* of the potentially valuable outcomes of physical education, health, and recreation are to be realized.

## INTERRELATIONSHIPS OF THE PROFESSIONS

To someone who has thought of physical education only in terms of the opportunities it provides for the teaching of motor skills and coaching, it may not be clear what physical education has in common with health education or recreation education. On the other hand, if it is recognized that regular physical activity of appropriate kinds has a profound effect on the physical welfare of all people in terms of growth and development and on the prevention of certain degenerative diseases, it becomes obvious that the positive health of people ("preventive medicine") is a common objective of both physical education and health education. Furthermore, the kinds of activities we engage in during our leisure hours, the types

of diversions we pursue as a means of maintaining our sanity in times of stress, are mutual concerns of all three professional areas. Certainly all three are ultimately concerned with the well-being (physical, mental, and spiritual) of the individual. The means utilized in the attainment of these lofty objectives may vary considerably, and the place within the community where these objectives are sought may also be different. But to the extent that all three are concerned with frequent use and knowledge of physical activity in meeting the physical, mental, and spiritual needs of human beings, they are related.

It is also important to recognize that because of the fact that physical education, health education, and recreation are all concerned with the effects of their programs on man's welfare, they all require training and background in the physical and psychological makeup of man.

Certainly it would be foolish to presume that there are no major differences in the three programs under discussion. Although there may be even greater differences developing as changes occur in our society, there are still sufficient similarities to justify a common core of early training experiences. For this reason it is assumed that the readers of this book will represent all three professional areas, and it is hoped that even though illustrations and examples may be taken from one or another particular field, it will be realized that the principles involved are intended for physical educators, health educators, and recreation specialists alike.

## THE QUESTION OF "MEANING"

After Hillary first conquered the terrifying heights of Mount Everest, he was asked why he would take such terrible risks and subject himself and others to such hardships in order to reach the top of a mountain peak. His famous response of "Because it is there!" seems, somehow, unsatisfactory. To most of us, sports, games, and other vigorous activities are *means* to the achievement of some goal rather than *ends* in themselves. Sometimes our actual purposes or goals may not be clear even to ourselves, but generally we can identify some motive for our actions such as the physical challenge involved, love of competition, desire to excel, better health, fitness needs, or, simply, the pleasure derived from success.

Because it is possible to derive different kinds of outcomes from a given activity, it becomes necessary for the educator to decide what specific outcomes he wishes to produce. How does one go about deciding what his specific aims are? Or should one simply provide instruction in the desired skills and give people the opportunity to participate and let *them* worry about the outcomes of this kind of behavior?

In physical education, for example, there are teachers who have no desire to get involved in the questions of "meaning" in physical activity. Their only concern is to teach people *how* to perform certain activities. The development of skill is their ultimate and only objective. Whether or not the learner continues to utilize the skills, whether

he derives any social, psychological, or physiological benefits, or whether he understands that there may be some such benefits are of no concern to this individual.

On the other hand, there are teachers who are deeply concerned about the values that students may be developing through participation. These teachers spend considerable time and effort in organizing their instruction so that skill development is accompanied by the acquisition of physical fitness. They strive to be certain that students understand the benefits and limitations of specific activities in terms of fitness and other factors. These teachers are concerned with the function of physical education in the total educational picture. These two types of teachers (those concerned with "meaning" and those not) are representative of two divergent philosophical viewpoints that characterize not only physical education but also health education and recreation.

## TECHNICIAN OR PROFESSIONAL?

To view the physical educator, health educator, or recreation leader as a technician means that he deals primarily with techniques. There is no implication that the *quality* of his work is inferior. There are excellent technicians and there are poor technicians; their distinguishing characteristic is that the *scope* of their activity is comparatively narrow. The technician's responsibilities are limited to the actual implementation of a program. He *administers* the activities that are set up by someone else. In some cases he may actually select the activities in his program, but this selection is based on the fact that they are being used by someone else. In short, the technician is concerned only with the practical matters of getting the program across to the students. He is not really concerned with *why* particular activities are presented at a certain level in the curriculum. The *theoretical* aspects of the function of his profession are neither his concern nor his responsibility. Someone else makes the decisions about what is "good."

The philosophical considerations and analytical processes that go into determining *why* the technician is teaching what he is teaching are the hallmarks of the professional. He must have the depth and breadth of knowledge to understand the needs of people and the means by which these needs can best be satisfied. He must be able to critically evaluate the effects of his program and make appropriate revisions. His *number one* characteristic is capacity for critical thought and analysis. He must be able to answer the question "Why?"

It is probably true that some people are more suited to the role of the technician than to that of the professional, and vice versa. It is apparent, for example, that most athletic coaches are technicians. How many different offensive formations or systems are in use in football today? Presently, the I formation (in which three backfield men line up directly behind the center and in which the fourth splits out to one side or the other as a potential pass receiver) is coming to the peak of its popularity. A few years ago nearly every

team in the country was using something called the split T. Prior to that we had the T formation that "revolutionized football." The old single wing is now nearly forgotten, and many players today have no idea how it would operate. Yet there was a time when it was considered the ultimate weapon of the game. (Similar "band wagon" phenomena could be identified in health education and recreation.)

Why do these changes occur? Do they just happen by coincidence? Is it a kind of spontaneous combustion? Or is there someone, somewhere, who has carefully studied the structure of the game and has analyzed, on a theoretical basis, the effects of certain kinds of action?

Why is there such widespread adoption of certain systems, to the exclusion of almost all others? Is it because the newest is the best? Could it be that when a famous college or professional coach is successful with a particular system, others rush to its adoption simply because he is successful with it? Are such innovations studied carefully with respect to the ability, size, or maturity of the players who are expected to execute them?

The coach who is a true professional fully understands the capabilities and limitations of his players and *creates* or *adopts* a system to fit these criteria. In order to create something new he must, of course, have some understanding of mechanisms, psychology, and even human anatomy and physiology. (Effective blocking technique, for example, is dependent upon factors in each of these categories.) Of course, the mere *possession* of a storehouse of knowledge is not enough. The ability to *use* this knowledge in unique ways is essential if one is to be a true professional in any career. Creativity and the ability to think critically are indispensable assets.

The question now becomes, should physical educators, health educators, and recreation leaders be expected to function primarily as technicians or primarily as professionals? Is there room for both? If so, how does one decide which to become? And if one decides to become an excellent technician (as a teacher of skills, for example) what assurance does he have that after a few years he will not wish to move into a position requiring the background and training of the professional?

Some schools have attempted to solve this problem by training at least all majors as potential professionals. Other schools have been content to concentrate on techniques and skills, assuming that most teachers and leaders will be functioning at the technical level.

Other professions have recognized a need to provide separate training programs for technicians and professionals. Medicine, for example, has the curriculum for the M.D. as well as the medical technician. Each is thoroughly trained in his field, but there is no expectation that the technician will ever be interested in assuming the responsibilities of the "professional." At the same time it is also assumed that the technician will be highly proficient through excellent training and diligent practice of his particular specialty. In other words, the assumption is that the jobs of the physician and the medical technician are *different*, requiring dif-


FIGURE 1.3 Examples of the "bandwagon" effect of certain attributes that often seem to gain uncritical approval because "everybody's doing it": (A) health movies, (B) jogging, (C) isometric exercise, (D) steam bathing.

ferent kinds of people. Neither job can be adequately performed without the conscientious dedication of the person involved. Although the physician's training requires greater depth and diversity of study (and therefore more time), that of the medical technician requires mastery of intricate procedures and techniques, many of which require constant practice for the maintenance of proficiency. In many cases these are techniques that physicians are never taught. They must rely on the skill and know-how of the technician to supply them with reliable information on the patient. It is obvious that an incorrect diagnosis due to either faulty judgment or unreliable information could be disastrous to the patient.

Thus, medicine has learned to handle many of its rapidly growing problems by a division of labor. A relatively few people are educated in the theoretical "whys and wherefores" requiring ex-


(C)


(D)

tensive background upon which understanding and judgment can be built. A great many people are recruited for training in the important, time-consuming laboratory tasks required in today's medical practice. The physician, with his theoretical knowledge, can then decide what procedures are necessary and can direct certain treatments that are then carried out by those who are primarily trained in the intricacies of the techniques involved.

There are signs that public education is following the lead of medicine. The preparation of the subject-matter *specialist* is being advocated; such specialists would act as "master teachers" and would determine what is to be taught and the sequence in which educational experiences would appear. The responsibility for determining what the "patient" needs and in what doses the prescription is to be administered would belong to the master teacher.

He would be the planner and coordinator. Teachers with less background but with very specialized training would complete the team. These team teachers would then be responsible for implementing the courses; that is, they would do the actual teaching.

This pattern, or modifications based on the team teaching principle, has been proposed for physical education and health education as well. The problem of what training the master teachers should have as compared with that required of the other team members has not been solved.

It is at this point that the medical analogy breaks down. In medicine the professional, with his mastery of physiological and pathological considerations, has been carrying the load for years. It is only recently that the technician has come onto the scene to aid him in doing a better job for society.

In physical education the *reverse* is true. For many years the vast majority of physical educators have been trained as technicians. They have been trained in the physical performance of skills and in techniques of teaching others how to perform the skills. But where is the professional who can provide the "diagnosis" of what skills students need and at what age and in what sequence? Where is the professional who can state, with authority based upon unimpeachable fact or logic, which of the benefits claimed for physical education are fact and which are myths or old wives' tales?

Only very recently have our universities turned their attention to the preparation of experts in study of human movement in all of its specialized ramifications. Only recently have programs sprung up for the education of specialists in the fields of exercise physiology, community health problems, consumer health, recreation and aging, psychology of motor learning, sociology of physical activity, recreation for the handicapped, philosophy of physical education, and other related subjects.

The rapid development of the attitude that we need to have experts to study and understand the "whys" of physical activity has caused considerable controversy within the profession. There has not been universal agreement as to exactly what the major objectives of physical education should be.

## SUMMARY

It is important for the student in health or physical education or recreation to closely analyze his motives for choosing his prospective profession. While curiosity about or *personal* interest in a subject may be sufficient reason for embarking upon some careers (astronomy, engineering, computer programming, automobile racing, and so on), success as an *educator* must be based upon an interest in people, not as objects to be studied or used, but as human beings to be helped. Such a focus of interest demands no less scholarship, however, than a more selfish approach. But it does modify the uses to which scholarly knowledge is applied.

While the three fields of physical education, health education, and recreation are distinct entities, they do have

*ally and socially fit citizens through the medium of physical activities which have been selected with a view to realizing these outcomes (79, p. 40).*

Eight years later Bucher's definition had not changed substantially, but several pages were devoted to the development of an appropriate understanding of education in general.

*. . . when you add the word* physical *to* education *you are referring to the process of education that goes on when activities that develop and maintain the human body are concerned (80, p. 17).*

Such views differ little from that presented by Hetherington over fifty years ago. He defined *education* as a lifelong process in which the individual's powers were developed "and adjusted to a social order for complete living." He equated physical education with fundamental education and suggested that it provided the basis for all the rest of education (176, p. 115).

In 1910 T. D. Wood and Clark Hetherington began writing about "the new physical education" as a broadening experience in the lives of students. Wood concluded that "physical education should occupy itself with a program of activities which would foster physical health, but they should be considered as by-products while the pupil was being guided toward the acquisition of mental, moral, or social benefits" (176, p. 115).

Despite some widespread insistence upon narrowing the objectives of physical education to those of "preparedness" during and following World War I, the focus of physical education during the first half of the twentieth century was on the broad contributions that could be made to the development of good citizenship. As wartime emergencies and cold-war pressures persisted, the fitness objective periodically waxed and waned in prominence, but "there is little doubt that the idea of physical education as a contribution to 'education for complete living' has been the dominant theme of the field since the early years of the twentieth century" (176, p. 122). Physical education proclaimed its value in terms of the contributions it could make to the "total education" of the individual "through the physical." As a specific medium of education, it could (and did) claim widely diversified objectives accumulated from the procession of educational theories that have influenced education since 1900.

One of the great difficulties encountered in trying to state the nature of the profession lies in the nature of the term *physical education* itself. One of the great early spokesmen for physical education, Jay B. Nash, has said that the word *physical* is a misnomer because it implies that there is some sort of inherent conflict between physical and mental activity (418). The idea of "educating the physical" has long been dismissed because it is self-contradictory. Still persisting, however, is much of the original confusion that has always accompanied the use of this term. Nearly thirty-five years after Nash's time, despite suggestions by many leaders that the name of the profession be changed to reduce confusion,

the old problem is still with us. In 1967 Janet Felshin wrote: "The name itself is unfortunate, of course, because it explains nothing. We know—unless we wish to deny overwhelming evidence to the contrary and claim a dualism of mind and body—that the 'physical' cannot be educated, and even if it could be, as programs of physical education have long seemed to suppose, what would such an education mean?" Felshin goes on to point out that a true discipline must be defined in terms of its unique subject matter.

> *Physical education has been explained not as the "study of . . ." but as the "teaching of . . . ," which has resulted in the paradox of an academic discipline in colleges that is defined by curriculum in schools* (176, p. 140).

No one would seriously suggest that by merely changing the name of our profession could any of these problems be solved. On the contrary, the changing of the name would merely be a reflection of the changes in the concepts of physical education that are presently occurring.

If we are to survive as an effective, contributing, educational agency, we must accept the obligation to become experts in the unique subject matter of our profession: *human physical activity* in all of its ramifications and implications. The current emphasis is on determining logical boundaries for the discipline. Although agreement has not yet been reached on details, it seems evident that our profession is moving rapidly toward defining its overall concern in terms of "man in motion." Thus, the study of man as a *moving* being becomes the focus of the profession, and all aspects of human movement become the unique domain of its members. The physiological effects of physical activity (or lack of it), the sociologicial implications of sports and games, the mechanical efficiency of motor skills, the psychological effects of participation, as well as the esthetic aspects of movement as represented by the dance (but not limited to dance) would all be legitimate parts of the discipline. Study would be devoted not only to the effects of movement (or exercise) on the life and welfare of the individual but also to the effects that the various forms of movement activity have on his surroundings and his culture.

It should be evident that in this system the educational aspects of human movement (including the preparation of teachers, skill instruction, and coaching) would be only a part of the profession's concern. Study of the movement-related phenomena for their own sake, regardless of any practical applications, would be a legitimate pursuit of scholars. Conceivably, some people would find positions in industry, the arts, government, and other environments on the basis of their expertise in exercise or movement.

## NATURE OF HEALTH EDUCATION

The term *health education*, in contrast to *physical education*, enjoys much greater universality of definition. The term *health* is itself more broadly conceived now than formerly. Instead of the old

negative concept of "freedom from disease and infirmity," it now carries a positive connotation: good health is a "state of complete physical, mental and social well-being" (500). Thus *health education* is defined as "the process of providing learning experiences which favorably influence understandings, attitudes and conduct in regard to individual and community health" (410, p. 7).

Health education is typically viewed as part of a more diverse school health program that also includes health services to pupils and a program of healthful school living. In small schools, especially elementary schools, there is usually no health education specialist, and all three phases of school health are distributed among the teachers and administrators. There is usually no school nurse, and health appraisal is limited to yearly hearing and vision testing by a visiting school nurse or some other trained person. Larger schools, especially high schools, are more likely to provide a resident school nurse who is responsible for most of the services such as referral, caring for sickness and injury while at school, appraisal, and so on. Such a specialist is also usually responsible for evaluating and upgrading healthful school living, often in cooperation with the health educator. Apparently, more large secondary schools are providing full-time health education teachers, even though a recent survey shows that there are still few health teachers who are strictly full-time; only about 7 percent of all health teachers for grades 9 through 12 are full-time in health education (500).

Although, in one recent study, over 50 percent of all "large" schools sampled in grades 9 through 12 offered a separate health education class, only 25 percent required health education for all grades 9 through 12. These percentages are slightly different for medium-sized and small schools. Interestingly enough, more medium-sized school systems required health instruction (37.5 percent) than did large schools, and small schools were very similar to large ones in this respect (24.9 percent) (500). All too often the health educator's "other" responsibility is coaching. Experience has shown that this is often not the best combination of responsibilities, and it is usually the health education that has suffered. The professional health associations are concertedly attempting to change this situation. There is little question that well-trained, full-time health educators are needed to carry out most effectively the objectives of the new health education.

Health education cannot be handled by a technician. It is multidisciplinary in nature. Its content is "derived from medicine, public health, and the physical, biological and social sciences" (500). It covers diverse areas from the nature of disease to marriage and parenthood. Modern health education methodology draws from the behavioral sciences. The nature of today's health education is such that programs must be implemented and conducted by well-trained professionals, not part-time or, for that matter, full-time teachers who are trained only as technicians (see pages 12–16).

In summary, health education is:

1. Multidisciplinary in nature
2. Dynamic (growing and improving) in nature

## THE NATURE OF RECREATION

"The most dangerous threat hanging over American society is the threat of leisure . . . " (161, p. 390). "The darkest threat to the well-being of the working man and the subject of increasing concern on the part of organized labor" is the burden of leisure (161, p. 390).

These grim statements from responsible leaders leave little doubt about the urgency of preparing Americans to cope with leisure. The problem of leisure in American life is intimately bound up with our consideration of recreation. This is not to imply that leisure and recreation are the same thing but to imply that it is difficult to consider recreation in any setting that does not involve leisure.

### DEFINITIONS

There is no universal agreement about the definition of leisure. It has been claimed that no real definition can be given. One of the problems is that the term is used to describe a block of available time, a feeling about obligations or lack of them, a tool for social control, an opportunity for self-improvement, or as a part of a work-rest dichotomy. It has been stated that the term should really be a verb, "to leisure," implying that some kind of a conscious process is going on (4).

The traditional definitions of leisure regard it as a block of time. This time is distinct from that spent in work or preparing for work. Even this concept, however, has its problems.

*Work is something to fulfill yourself with. Work is something you love to do, not something you do with your eye on the timeclock. . . . A job is different. We have replaced the concept of work with the concept of the job. A job is something we give as little of ourselves to as possible and try to get as much for as we can, and try to get away from as soon as we can. . . . I don't use the term "leisure." I use the term "work" as I'm going to use the correlative term "play." It is work in the old sense which we need to recapture, work that gives us buoyancy and a feeling of expressiveness, work which we may do while we're making a living, but also that we may do off the job while we're making a life . . . .*

*I suggest that there is something very different from fun. There is play . . . Play is something which is totally expressive but doesn't end in a product. It doesn't have to end in a product. It is a thing in itself, worthwhile in itself"* (335).

Another has made the distinction between work and play in other terms:

*Work is the main course, the meat and the substance of our lives. Recreation is the dessert; we like it best in modest portions at the end of a good meal. When we try to substitute the dessert for the meal itself, we lose our taste for it* (72, p. 23).

Kelso and Adler stated the relationships among work, leisure, and play this way:

*Play, like sleep, washes away the fatigues and tensions that result from the service occupations of life, all the forms of labor which produce the goods of subsistence and all the leisure activities which produce the goods of civilization. Play and sleep, as Aristotle pointed out, are for the sake of these services and socially useful occupations. Since the activities of leisure can be as exacting and tiring as the activities of toil, some form of relaxation, whether sleep or play or both, is required by those who work productively (300, p. 17).*

Brightbill has defined "play" as "the free, happy, and natural expression of animals—especially the human animal . . . When we refer to adult activity," he continues, "play might more fittingly be called *recreation*" (72, p. 30).

It is clear that when we refer to recreation we are not indicating any particular activity or class of activities. That which is work for one can easily be regarded as recreation by another. There is another important distinction to be made with regard to this term. Whereas recreation up to this point has been discussed in its general connotations, we are particularly interested in it as an organized service profession. Perhaps the term Recreation Education, or Recreation Leadership would be more appropriate in this context. In any event, we will need to look at both the general nature of recreation, its history and cultural implications, as well as at the systematized structure that has been created to deal with the leisure time activities of human beings.

# PROFESSIONAL OBJECTIVES

## OBJECTIVES OF PHYSICAL EDUCATION

It has been mentioned that regardless of the philosophical winds that have blown through physical education over the years, certain objectives have consistently retained a prominent place in the overall aims of the profession. Two of these are, of course, health and physical fitness. Because these particular objectives have persisted, it must not be assumed that they are universally accepted as being the most important objectives. Because disagreement about the relative importance of particular objectives is inevitable, it is impossible to make any list of primary and secondary objectives that will be satisfactory to the entire profession.

On the other hand, it is possible to group most of the commonly held objectives into a few descriptive categories. This has been done in a great variety of ways, some more detailed than others.

*Organic development* is generally considered to be of importance. This would include, among other things, the maintenance of health through good health practices and the development of physical fitness including sufficient strength, circulo-respiratory and muscular endurance to avoid excessive fatigue and to insure adequate energy levels. Although the development of sports and recreational skills is usually covered under a separate heading of *neuromuscular development,* it too could be considered one of the organic objectives.

*Social development* is another objective that is universally listed. The ability to function effectively with others and in groups is usually considered an important outcome to be sought through physical education. The emotional control that may be learned as a part of participation in games and contests is considered important. The acquisition of the qualities of cooperation, leadership, and related factors is also valued.

Closely related to social development is the objective of *psychological development*. Subsumed under this heading would be such things as improved personality characteristics, self-confidence, self-respect, and opportunity for self-fulfillment and self-realization. Frequently included in this category are claims that physical education contributes to the generalized learning abilities of the child. A few schools have deliberately designed their curricula with this objective uppermost in their thinking.

The *cognitive objective* (sometimes called *intellectual development*) is that traditionally stressed by teachers of "academic" subjects. Although health educators have long been concerned with helping students gain understanding of certain facts and principles, physical educators have generally limited their cognitive emphasis to knowledge of rules and strategy of sports and games. It is apparent, however, that the cognitive objective has assumed a role of major importance in recent years. Much of this book is devoted to the subject matter of physical education in the belief that the knowledge of such information is important to the welfare of professional and layman alike.

An objective that is seldom discussed is that of *philosophical development*. The great difficulty in dealing effectively with the teaching and evaluation of ethics and values is apparent. It has become increasingly apparent, however, that society is in urgent need of coming to grips with the problem of values in today's world. The question of whether sports and physical education effectively shape desirable value systems is one that must come under increasingly close scrutiny. The quality of the professional leadership available is obviously crucial to the attainment of any objective; it is of particular importance in the case of realizing philosophical objectives.

## CURRENT PRACTICE IN PHYSICAL EDUCATION

Which objectives are being stressed in physical education today? Of course, if one looks hard enough almost anything can be found somewhere. On the other hand, it is frequently possible to identify trends or patterns as they emerge in response to changing circumstances over a period of time.

After World War II, and especially since the late 1950s, the physical fitness status of American youngsters has certainly received a great deal of attention. Similarly, it is apparent that interscholastic athletics (beginning even at the elementary school level in some cases) are enjoying unprecedented popularity. On the basis of these informal

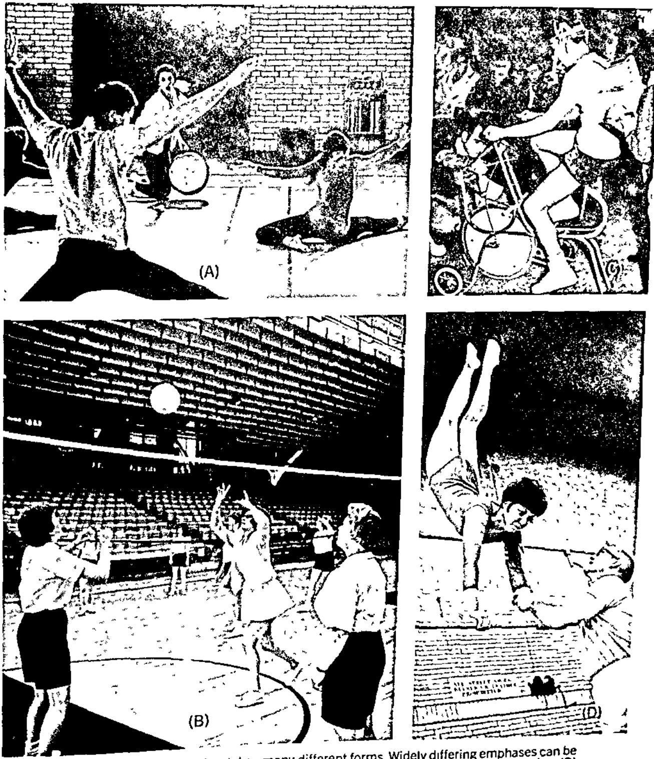

FIGURE 2.1 Physical education has taken many different forms. Widely differing emphases can be found, as illustrated: (A) modern dance, (B) sports skills, (C) physiological effects of exercise, (D) gymnastics.

living and well-being and to concentrate on the most valuable of these. This would mean that even though society may value very highly the ability of its citizens to get along with one another peaceably, physical education would not make these its major aims because many other aspects of the school program (drama, music, school government, and classroom and committee assignments) contribute to the social objectives. It would, of course, cooperate in making efforts wherever it could to reinforce desirable behavior in this regard.

Illustrations of the things that might be seen as being unique to physical education would be concerns such as physical fitness, sports skills, exercise techniques, and intellectual awareness of the physiological and psychological effects of exercise and sports participation. It should be noted that these are only examples and should not be interpreted as being an exhaustive list of the unique concerns of physical education. The only criterion required for determining whether a given objective should be placed on the list would be that of unique and ultimate responsibility. That is, if a given individual appears to have failed in the attainment of certain objectives, *to whom can he be referred for remedial action?* If, for example, a student seems continually depressed and uncommunicative despite all efforts of the instructor, he should be referred to the school psychologist. On the other hand, where does the instructor send the youngster who is chronically low on the physical fitness scale? The fact is that there is no one (including physicians, physiologists, and therapists) who have the training and background in this area that the physical educator is expected to have. Therefore, physical fitness is classified as one of the unique objectives. The only question remaining is whether it is a sufficiently important objective to be given priority. This decision must be made on the basis of philosophical considerations.

From the preceding discussion it should be clear that if one views physical education primarily as a tool to be used in achieving overall educational goals, then its primary objectives will change whenever changes in society's educational emphasis occur. Under such conditions physical education is a process or procedure, not a discipline, and cannot logically have any objectives of its own. If, however, physical educational emphasis occur. Under such conditions physical education is ber of legitimate objectives can be established *independent* of the goals of general education. Because such goals would be oriented to the preservation of the efficiency of movement (that is, the prevention of degenerative disease, the acquisition of desirable body image, the development of certain kinesthetic appreciations, and so on), they would generally be in harmony with the aims of general education. In many cases the realization of the goals of physical education (particularly those related to physical and mental health) would be prerequisite to the pursuit of many of the socially and/or politically determined goals of general education.

Up until the present, however, it is evident that physical education has been viewed pretty much as a tool of general education in the achievement of broad, cultural goals. As a result there have been a great many changes in the emphasis of physical education both in this country and abroad.

## Opportunities in Physical Education

Physical education is an extremely broad profession frequently merging into health education programs or recreation programs. Because the programs he is equipped to direct and the objectives he is dedicated to pursuing are utilized by different organizations in a variety of settings, the competent, *well prepared* physical educator will discover that he has a choice of many professional opportunities.

The various divisions of the school structure offer a great many opportunities to the prospective professional. Physical education teachers are needed at elementary, junior high, senior high, junior college, and college levels. Elementary specialists are in increasing demand, including both men and women. Some of the most challenging and exciting work in physical education is now being conducted at the elementary school level.

The junior and senior high schools continue to provide the bulk of positions. With burgeoning populations and new construction everywhere, positions are more numerous than ever before. It should be carefully noted, however, that in some areas of the country there are more male physical educators graduated than there are positions, particularly at the secondary level. Keep in mind, however, that there is always a demand for the *good*, well prepared physical educator. This concept, involving a clearcut distinction between positions in coaching and physical education, will be amplified later. Of course positions for women at the secondary level are always available, many of them remaining unfilled for lack of applicants.

At the college level there are several kinds of professional opportunity. One of these involves teachers of skills and games. Traditional college programs usually provide opportunities for students to enroll in classes in which they can improve or maintain physical fitness levels and learn skills that will be useful to them in their post-college years. Most colleges require at least a master's degree of all teachers, and many require higher degrees.

In recent years there has been considerable interest in revising college required physical education programs to place more emphasis on the *understanding* of how physical activity, sport, and play contribute to the health and well-being of the individual. Such programs are designed to add a dimension to traditional skill and fitness-oriented programs and should not be interpreted as a substitution of intellectual activity for physical activity. Teachers in this kind of program require greater depth of training than is usually available in the master's degree curriculum. Most schools employ team teaching techniques in conducting the various aspects of such programs.

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Of course the training of future teachers of physical education requires large numbers of competent professors. Such positions almost always require a doctoral degree as well as teaching experience at other levels. In addition to professional teaching opportunities, many universities now have research specialists who have only limited teaching responsibilities and spend most of their time in research endeavors.

Other positions for which graduate work is required include administrative or supervisory positions at all levels of physical education. While coaching responsibilities are not generally regarded as requiring advanced graduate study, many colleges do not hire people for coaching responsibilities alone, and in such cases advanced degrees are mandatory.

Opportunities existing outside the schools cannot all be listed. Some of those most commonly pursued by physical educators are found in organizations such as the YMCA, YWCA, YMHA, community centers, and municipal or private clubs. Boys' clubs, hospitals, churches, industrial concerns and other agencies also frequently employ physical education specialists.

It is becoming clear that this is an age of specialization. While a broad background is always necessary for effective professional accomplishment, today's problems require an expertise that cannot be attained without specialized study. This means not only better undergraduate theoretical and technical preparation but also advanced study. Specialists are commonly employed for positions in dance, acquatics, elementary physical education and gymnastics in the public schools. At the college level specialization is even more narrow. The person who plans to make the most of his potential must strive to secure the best possible undergraduate preparation upon which to select and build a future specialty.

## OBJECTIVES OF HEALTH EDUCATION

In terms of the establishment of general objectives, health educators have (at least in recent years) achieved greater unanimity than have physical educators. Since "health" has been defined in rather specific terms, it has been relatively simple to devise objectives for the educator to pursue.

It must be emphasized, however, that the field of health education is so broad (encompassing everything from sex education to the problem of metabolic disturbance resulting from rapid time zone change in east-west air travel) that it is essential that priorities be established on the basis of importance. Since there is always basis for disagreement on relative importance of specific objectives, there is still considerable disparity among health education programs throughout the country.

Many problems have been encountered in dealing with controversial topics such as sex education, birth control, drug abuse, alcoholism, fluoridation, and smoking. It is virtually impossible to separate social issues and value judgments from such issues, yet health educators are frequently forbidden to utilize any methods other than an objective approach (if indeed,

profession comes immediately to mind, but many of the other possibilities for service in this important area are not so apparent to the student beginning his college studies. Medical sociology, physical therapy, sanitation engineering, public health nursing, hospital administration, medical technology, biostatistics, and dental hygiene are just a few examples of many health-related career opportunities. These, of course, require preparation of varying kinds and amounts not usually a part of the programs in university departments of health, physical education, and recreation. The careers for which you can prepare in such departments are more likely to directly involve education. There is a need for more well prepared health educators, public and school. The school health educator is concerned primarily with planning and conducting educational programs within the public school organization, though he certainly can promote public health education as well. Most persons trained in health education have naturally gravitated in the direction of public school teaching positions. But public health departments and agencies are more and more becoming interested in utilizing the full-time services of public health educators. They also recognize the need for more in-depth preparation of such persons, especially with regard to the scientific bases of health.

The health educator with a baccalaureate degree may also continue his professional preparation by studying for a master's degree. Those with the interest, background, and intellectual capacity can achieve a doctorate, specializing either in health-related research or in health education or both. Such professionals most often choose to affiliate themselves with colleges or universities, but there are other agencies and institutions in need of these professionals as well.

The need is apparent and the opportunities for service in the health-related professions are both great and varied.

## OBJECTIVES OF RECREATION

Like the objectives of physical education and health education, the objectives of recreation have undergone change over the years. The goals sought by each teacher will, of course, vary depending upon the people and problems with which he works.

The Commission on Goals for American Recreation has produced a statement encompassing six objectives (119).

1. Personal fulfillment. In emphasizing the importance of the individual in our society, recreation is viewed as having one outstanding purpose: to enrich the lives of people. "One approaches personal fulfillment as he narrows the gap between his potentialities and his accomplishments." The recreation leader's challenge is to provide experiences "through which the individual may enjoy success in his search for adequacy or self-esteem."
2. Democratic human relations. Since exclusive concentration on personal goals may lead to the development of

to achieve more than simply "keeping the kids off the street," however, preparation of leaders who understand the problems and know the principles involved in developing solutions requires *at least* four years of college level preparation.

## Opportunities in Recreation

Recreational opportunities, as one would expect, have expanded enormously in the past twenty years. Because so many kinds of programs are provided in communities, people with widely divergent interests may find employment in one of them.

Some of the institutions and agencies with organized recreation programs and recreation personnel are:

1. Federal, state, city, and local governmental divisions. This includes parks, schools, conservation departments, military establishments, forestry service, and welfare agencies. Federal grants are currently providing a number of extensive recreation programs.
2. Private agencies. Well-known agencies such as the YMCA, YWCA, YMHA, church-sponsored community centers, Boy Scouts, Girl Scouts, and Campfire Girls continue to require large numbers of qualified leaders. Other organizations such as private clubs, camps, and charitable organizations require leaders with training to operate camps and organize community projects.
3. Commercial agencies. Many commercial enterprises hire specialists in the organization and teaching of recreational activities. Summer resorts, bowling alleys, theaters, food specialty chains, and manufacturers of sporting goods are some of the kinds of agencies interested in recreation.
4. Industrial plants. Industrial plants have moved into the area of recreation with large programs. Frequently programs are sponsored throughout the year for the entire family of the employee. With the recognition of the fact that private industry must take a large share of responsibility for the provision of things that will assist less affluent members of our society to achieve their potential, more emphasis is likely to be placed on programs such as these.
5. School programs. It has long been evident that schools in city and suburban areas needed to become centers for more kinds of community activity. Taxpayers are beginning to insist that the vast funds expended in school construction return greater dividends in terms of more use. This means that recreation programs, not just for children but for all segments of the community, are being established in school facilities. Although school personnel may occasionally be involved in such endeavors, the programs themselves are frequently separate from the school operation, and personnel are not school teachers putting in extra hours. Such "lighted schoolhouse" programs can aid in solving the fundamental problems of providing the necessary funds to meet the needs of the community.

## Effectiveness of Recreation Programs

The evaluation of the effectiveness of recreation programs in terms of the established objectives is exceedingly

difficult. Because other factors also bear on those that the recreation professional is interested in, it is difficult to conclude just which factors produce what effects.

The new governmental programs mentioned previously, for example, utilize a great many techniques in attempting to get potentially capable youngsters prepared for college. Recreation is only one of these techniques. It is difficult to evaluate reports claiming success in teaching Spanish or geometry in Head Start programs by the incorporation of recreation techniques. Another problem is that when we begin talking about the use of recreational techniques in teaching or in obtaining some desired behavior, are we still talking about recreation? Some people feel that we are not.

It is easier to assess the effects of leadership on the kinds of programs produced and the number who participate. These kinds of research have considerable usefulness in establishing the need for capable recreation leaders. For example, a report by Chandler and Hyde (98) indicated that in an institution for elderly people, the social interaction and participation of socializing activities were dependent upon the presence of a recreation leader. His absence resulted in a 50 percent reduction in socializing behavior.

Other studies relating to health, physical fitness, social, and psychological characteristics have been reported in other sections of this book. Many of these could be regarded as being pertinent to recreation because of the kinds of activities involved.

There remains a great deal to be learned about the overall effects that recreation programs can have on our complex, confusing culture. Can the depersonalizing effects of the computer age be forstalled? Can concern and compassion be a part of a mechanized, sophisticated (sometimes cynical) society? These are only examples of the important questions that need answers.

*Play is more than a pastime, it is a fundamental tool for the discovery and rediscovery of the meaning of living. An understanding of the relationship between play and the development and fulfillment of the self is a prerequisite for effective programing. The creation of recreation theory rests upon this cornerstone (506, p. 50).*

## SUMMARY

Definitions of physical education vary significantly and are usually phrased in terms of what physical educators *do* rather than what they study. Part of the difficulty in coming to substantial agreement on primary objectives for physical education may stem from lack of agreement about what physical education really is. It has been suggested that the study of human physical activity, with all its implications, should define the limits of physical education.

Health education has had few problems of definition, but "health" as a concept has undergone considerable expansion in recent years. While separate classes in health education are found in most of the larger schools, full-time health educators are still the exception rather than the rule.

Recreation, as a career, defies precise definition, much as physical education does. Its operation is closely associated with man's leisure but is certainly not synonymous with it. The concepts of work, play, and recreation are complexly intertwined making the tasks of recreation leaders exceedingly important, as well as difficult.

Although it is not currently possible to get physical educators to agree on the *primary* objectives of physical education, the major objectives most often articulated can be placed into general categories such as: (1) organic development, (2) social development, (3) psychological development, (4) development of cognition, (5) philosophical development. The objectives most commonly stressed have fluctuated with social conditions and shifts in educational philosophy. It is suggested that the objectives most commonly pursued with greatest vigor are not necessarily the objectives of greatest importance to the welfare of the student.

Criteria for the establishment of objectives are based on philosophical considerations. The wide variety of objectives is understandable in the light of differences in philosophy within the profession. One way to simplify the problem of selection of primary objectives would be to make selections on the basis of the *uniqueness* of contributions of physical education to individuals. One problem is that this procedure ignores the establishment of priorities in terms of the relative *importance* of all possible objectives. That is, if uniqueness *alone* were used as a criterion, the matter of whether a given objective has any relevance to the needs of individuals would not even be considered. Selection of only the unique, *important* objectives again involves philosophical considerations and may narrow the scope of professional concern excessively.

The broad, basic objectives of health education have been well articulated and are widely accepted. Other problems have been encountered, however, in the matter of controversial subject matter (such as drugs, sex education, and smoking) and in the matters of exactly which techniques should be used in the pursuit of desired objectives.

Objectives of professional recreation leaders have changed considerably in recent years as social problems have multiplied. Although *primary* objectives of recreation may differ substantially from those of health education or physical education, the tools and activities used in their achievment are nearly identical with those used in the other professions. Opportunities for employment in each of the three fields are greater today than ever before. The serious nature of the problems now being faced has, however, made the quality of professional preparation an extremely important factor in securing desirable positions.

## PRINCIPLES

1. If man is viewed as an entity (as opposed to the old dualistic concept of a mind and a body), the term "physical education" becomes entirely unwieldy as a name for a discipline.

2. The boundaries of a discipline cannot be adequately defined in terms of what its professional members do. Generally, it must be described in terms of "the study of . . ." rather than "the teaching of. . . ."
3. If an overall discipline can be defined as the study of human physical activity, physical education (the teaching of concepts, skills, and techniques), would logically become the educational arm of the discipline.
4. Health, as a concept, is more than mere absence of disease; it is a state of complete physical, mental, and social well-being.
5. Political and economic conditions have resulted in the possibility of mass leisure that looms simultaneously as a potential threat and a potential blessing.
6. The fact that a given professional objective has widespread approval and practical support does *not* necessarily mean that it is more important than other less popular objectives.
7. Two distinct approaches to the problem of determining objectives to be given priority can be identified. One is to determine the needs of the student and shape objectives to fit these needs; the other is to identify the potential *unique* contributions of the discipline and structure objectives around them.

## EXPERIMENTS AND EXPERIENCES

1. Create a check sheet listing as many "possible objectives" of physical education as the class can formulate. Each class member should then rank these objectives in the order that he *believes* most accurately reflects the objectives of high school physical education programs.
2. Survey the class and determine the percentage of students who have experienced formal, classroom instruction in health (apart from that incorporated into science courses).
3. Contact all available community recreation agencies and determine the number of events sponsored that have as their objective the improved health of their members.
4. Obtain a list of facilities available for recreation in your city. Estimate the maximum number of people that could be accommodated at any one time. What implications does this have for future programs of recreation?

## SUGGESTED READINGS

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# Development and Current Status of the Professions

## Chapter 3

### STATUS OF PHYSICAL EDUCATION

In looking at the picture in the public schools today, it is easy to identify the major patterns followed by physical educators. Sports skills and physical fitness are obviously the two factors most commonly stressed. Furthermore, in many instances the fitness objective is applied to the great mass of students while the skills objective is vigorously pursued with only a relatively few talented performers, who are usually members of interscholastic teams. Although it is true that the skills of team and individual sports are used as the basis of the curriculum in most schools today, inadequate facilities, large classes, and other factors have resulted in programs providing very little individual evaluation and instruction for most students. On the other hand, great attention has been given to this type of instruction at the varsity level.

In very blunt terms this means that in too many schools physical education classes consist of large groups of students being turned loose in small gymnasiums to play some form of team game. Instruction is usually minimal or entirely absent.

Evaluation of student needs and progress is usually a matter of guesswork rather than objective measurement. On the other hand, varsity sports are given a great deal of attention, time, and money. The coach-player ratio is very low, and several assistants are usually available to aid the head coach.

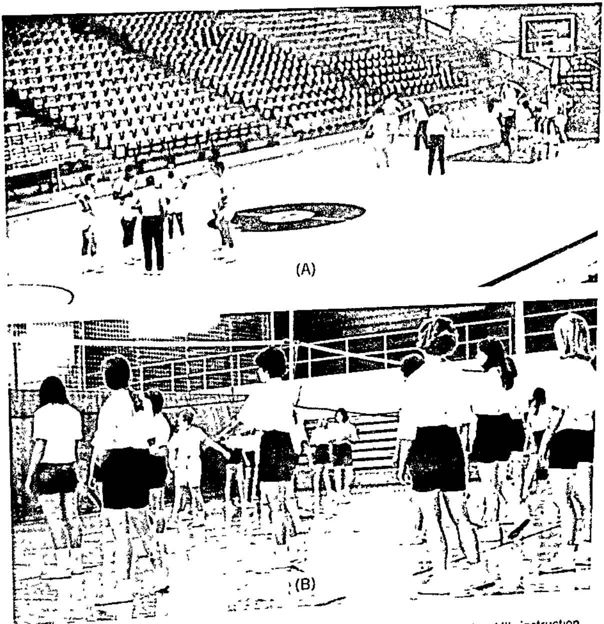



**FIGURE 3.1** Even in the finest American school systems, the best conditions for skills instruction (as illustrated by student teacher ratio and adequacy of facilities) are provided for those who have the greatest ability. Pictured are. (A) varsity basketball players and coaches and (B) girls' physical education class and teacher.

## DEVELOPMENT OF PHYSICAL EDUCATION

As has already been pointed out, several factors in our recent history have combined to shape our present philosophies and practices in physical education, as well as health education and recreation. If you are typical of the student who is just entering one of these professions, you are more interested in considering the future than the past. For that reason a detailed discussion of the history of physical education will not be presented. But because it is helpful in many ways to understand some of the events that have led up to our present circumstances, a brief backward glance will be taken here.

Physical education as a part of the public school curriculum may well owe its existence to war. The physical survival of individuals, as well as societies, has historically depended upon the ability of men to defeat other men in physical combat. It is not surprising to find, in looking back over the years, that nations have always demanded increased fitness for their citizens whenever wars have threatened.

### PREHISTORY

If one is willing to interpret *physical education* in a very liberal way, it is possible to say that the instructions given by cave-dwelling fathers to their sons in techniques of stalking and killing game (as well as human enemies) constituted a kind of physical education. Indeed, survival depended upon swiftness of foot and strength of arm; survival of the fittest was the most fundamental of laws. Under such circumstances of daily crisis (or "war") there is no doubt that physical fitness was a state to be highly valued. Observations of this kind have only limited value, of course, because no one would suggest that there existed any kind of formalized program of education during this period.

The earliest known records of systemized instruction in exercise for purposes other than combat are those from early Egypt and surrounding regions. It is apparent that, for certain classes of people at least, skill was developed in activities such as swimming, wrestling, dancing, and gymnastics as early as 2000 B.C. Instruction in activities more directly related to combat, such as archery, riding, and boxing, was also common.

### EARLY CIVILIZATION

Although it is generally agreed that civilization developed earliest in the southern Mediterranean countries, it is also apparent that the Chinese produced a remarkable early culture. As the mystical religions of the east developed, less and less emphasis was placed on the care of the body. Because war was viewed more as a necessary evil than as a worthy pursuit of life, educational systems for the training of soldiers did not become as highly developed as in other countries. Ancient China did, however, produce a system of light exercises designed to prevent disease. This form of medical

gymnastics called *Cong Fu* combined stretching and breathing exercises and was usually performed in a sitting or kneeling position.

Examination of historical accounts of other ancient civilizations indicates that most activities that could conceivably be labeled "physical education" were generally connected either with religious rites (as with the dance) or with preparation for combat. From a recreational standpoint there have been games and pursuits such as hunting, fishing, and other activities practiced since antiquity. Some of the most ancient artifacts are toys that were used by children in their play. Ancient references to ball games of one kind or another can be found in both written accounts and art of the various periods.

## EARLY JEWISH INFLUENCE

One of the ancient cultures having most influence in the development of Western civilization was that of the Hebrew people. Whereas the great emphasis on education generally excluded anything that could really be called physical education, it is of great interest to note the fact that the religious laws provided for health practices that were far advanced over other civilizations of the time. Cleanliness in the preparation of foods, the cleansing of eating utensils, and the washing of wounds under running water anticipated many modern disease-prevention practices.

Although the ancient Hebrew people apparently had great respect for human strength and although they certainly recognized the need for training for warfare, their culture made little provision for sport or games. Whereas the influence of conquerors had, from time to time, caused Jewish communities to build stadiums or other sporting facilities, such influences were usually rejected when the domination of the conquerors ended. So, although we have derived many of our precepts about education and the responsibility of parents for the education of their children from the Hebrew tradition, little else that directly applies to physical education or modern recreational practices can be attributed to the ancient Jewish influence.

## THE GOLDEN AGE

On the other hand, one of the cultures having the greatest influence on modern practices in our profession was that of the early Greek civilization. One of the most obvious signs of this influence is that of the Olympic Games; this sporting festival originated in Greece about 776 B.C. as one of several such festivals held periodically. They achieved such importance that wars among various city-states came to a halt temporarily in order that the Olympics might be held every fourth year.

The idea of periodic international athletic competition is only one of many concepts that have been borrowed from the remarkable culture of the early Greeks. This period has been called the Golden Age because of the almost unbelievable contributions it made to the culture of man. Art, science, music, drama, philosophy, education,

commerce, agriculture, and practically every other endeavor of man received a tremendous acceleration during this period. In short, this was the birth of Western civilization.

Most of the information we have about the ancient Greeks has come to us through such accounts of life as were recorded by Homer in the *Iliad* and the *Odyssey*. Through the accounts of such heroes as Achilles and Odysseus we learn not only of the ideals valued by society but also of the educational aims and goals. The detailed accounts of the funeral games and the religious ceremonies give us a picture of a vigorous people who, even though they were in a position to make choices, apparently had no desire to lead a life of ease. We are also led to see the development of a society that placed the highest possible value on the harmonious development of all aspects of an individual's capabilities; action and wisdom were highly prized as characteristics to be equally developed. It is interesting to note that as the Greek culture evolved, it became taken for granted that every citizen had a responsibility to exercise daily in addition to other duties, including strenuous military training. The state provided gymnasiums for the use of all male citizens, and it was expected that even older men would make use of the facilities for their physical well-being. Of course, it must be remembered that cultural activities of other kinds also took place at the gymnasium, especially during the later period of that age.

It must not be assumed that aims and practices were uniform throughout ancient Greece or that these remained constant across the years. You will remember that Greece was composed of a group of city-states, each independent from the other. Athens and Sparta were two of the largest and most influential and are representative of differing attitudes toward the citizen's preparation to meet these responsibilities. Although a more detailed discussion of the philosophies involved will be found in Chapter 7, you will remember that, in general, Sparta stressed military preparedness and discipline whereas Athens was noted for its more democratic emphasis in securing the services of the individual for the state. There were other differences as well, but there were also some significant similarities.

One of the most interesting characteristics of the city-states was their belief in the involvement of citizens in the affairs of the state. This is exemplified not only in the training for fighting that was expected of every citizen but also in the fact that the citizens themselves were the participants in the games of the various festivals. Apparently nothing was more highly prized than to be the well-rounded man, a perfect balance between the man of action and the man of wisdom.

It has been said that one of the significant reasons for the great cultural accomplishments of this period was that unusual individual freedom of thought and action was coupled with individual responsibility for civic affairs. Similarly, it has been observed that this society passed its pinnacle when freedom led to individualism without a civic concern. When prestige



**FIGURE 3.2** Ancient Greece was remarkable for its equal emphasis on the perfection of physical and mental attributes. (A) Demosthenes, antique sculpture (Vatican Musuem, Rome, Alinari—Art Reference Bureau), (B) Myron's Discobolus, Roman copy after bronze original (National Museum, Rome).

became more easily obtainable through wealth and political power than through individual cultural and physical accomplishments, the strength of the city-states began to crumble. The vulnerability of Greece was further increased by the shift in concept from idealizing the man of balanced action and wisdom to idealizing the man of wisdom only.

If the story of physical education in Greece were nothing more than another example of how a young, vigorous nation rose to a position of prominence and then, through neglect of physical vitality, fell prey to another more vigorous culture, there would be little that is unique to study. In this case, however, physical activity, athletic performance, and the maintenance of physical fitness were regarded, for the first time, as something more than mere preparation for war or individual combat. There was a period at the height of the Greek civilization when education was thought to be complete only when a

man could perform as well as think. For a young man to exhibit a flabby body was to admit a deficiency in his education (see Chapter 7).

Furthermore, the esthetics of performance were highly valued. The appearance of the body was ideally to suggest a fine balance and harmony of development. The classical Greek statuary indicates the esteem in which grace and harmony were held, as opposed to muscular bulk for its own sake. It is also true that during this period the quality or appearance of the performance was regarded as highly as was the final outcome in terms of winning and losing.

With the decline in participation in games by the citizenry and the concomitant increase in professionalism, less and less emphasis was placed upon the *experience* of performing; the *outcome*, as well as the entertainment provided by the spectacle, became the important factors.

## ROMAN INFLUENCE

After the Greek civilization fell to the Macedonians, and later to the Roman Empire, much of the unique character of the Greek attitude toward physical education was lost. The Roman had no taste for the Greek tendency to involve himself in the games and contests of the many festivals. The Roman preferred to observe the giant free spectacles from the comfort of the grandstand. Furthermore, the Roman had become accustomed to the emotionally charged spectacles of bloody gladiatorial combat and brutal contests between animals as well as between men and animals. The relatively tame contests involving the throwing of the javelin or the discus had little attraction for him. And whereas he found some entertainment in observing the time honored wrestling and boxing contests of the Greeks, he found it necessary to brutalize even these. The wearing of nailed gloves and riveted fist wrappings became so popular that blows produced gory wounds and hideous permanent injury, if not death. It is little wonder that after years of observing "athletic" contests of this nature, founders of the early Christian church turned away from any consideration of physical activity or exercise as a worthwhile pursuit. The fact that many of the early Christians were slaves who might themselves be subjected to deadly mock wars or animal combat in the arena for the pleasure of the masses might well have encouraged them to emphasize the spiritual, otherworldly aspects of their religion.

Whatever the reasons, it is a fact that as the influence of Christianity grew, the legitimacy of sport and physical training declined. The glorification of the body came to be regarded as a sinful tendency to be resisted at all costs. It was during this period that the body and spirit were pictured as two separate entities constantly warring against each other. In order to elevate the spirit, and thereby come closer to God, people subjected themselves to all kinds of physical discomforts and tortures. Any suggestion during this period that man was a single organism and that the

of knowledge, to comprehend the period of nearly a thousand years of retrogression and stagnation as far as learning was concerned. Only a worldwide nuclear holocaust could approximate today the conditions prevailing at the depths of the terror-ridden Dark Ages. Under such circumstances survival is the only objective of any personal importance; cultural considerations are nonexistent.

## THE RENAISSANCE

About the tenth century, however, there were stirrings of interest in matters beyond the local level. The causes and implications of this beginning of the period known as the Renaissance cannot be discussed here, except to indicate that religion and the Church played an important part in this revival of culture. The simple fact that representatives of European areas began to venture once again into unknown lands created the conditions for exchange of knowledge, an aroused curiosity concerning other peoples, and a basis for at least a limited commerce among peoples. The crusades into the holy lands, as destructive and as poorly conceived as they often were, did contribute substantially to the rekindling of interest in learning and culture.

It was during this time that knighthood provided the only arena in which any physical education was practiced. The familiar stories of jousting and tournaments provide descriptions of the kinds of activities that young men of noble birth, at least, might hope to pursue. But it is clear that these activities were really no different than those practiced over a thousand years earlier. One significant difference, however, was the creed of chivalry that served over the years as a prominent factor in raising barbarianism to the level of civilization.

Despite the fact that the new enlightenment brought the development of universities and the congregation of young men who frequently engaged in games and sports of one kind or another, there was no official sanction or encouragement of such amusements. Gradually some of the private schools of southern Europe began to include some provision for exercise and recreation. In most others, however, such activities were either ignored or frowned upon by educators of the day.

This is not to say that there was not considerable interest in sporting activities during the Renaissance. Fencing masters were in great demand among the wealthier segments of society. Bowling on the green, tennis, and dancing, as well as other spectator amusements, were very popular. In an era when courtliness and good manners were stressed, many of these activities were considered indispensable means of promoting proper carriage and grace. All this was in addition to the time-honored practices of riding, wrestling, swimming, shooting, and other combat-related activities.

As the renewed interest in learning progressed, it was accompanied by a great social and political upheaval. Dis-

satisfaction with punitive economic practices spelled the collapse of feudalism, just as revolt against religious despotism resulted in far-reaching political and religious reforms. And although the *Protestant reformation* led to the creation of many denominations and sects, it did not produce greater religious tolerance. Conflict and persecution were responsible in a large measure for the establishment of colonies in the lands newly discovered by those who were seeking new trade routes. The hard work and privation required for survival in frontier settlements combined with religious doctrines (that tended to brand as sinful any form of recreation) to effectively prevent acceptance of physical education as a part of the school curriculum in the New World, as well as throughout much of the Old World. Social events were generally built around one of two legitimate activities: worship or work. Any activities that might be termed recreational needed to have some productive purpose such as that provided by quilting bees, house raising, or harvest contests. Even the natural playfulness of children was considered frivolous activity that must be curbed as early as possible.

## THE ENLIGHTENMENT

In the seventeenth century it was the rule rather than the exception to regard children as being little adults. In this kind of atmosphere it is not surprising that little thought was given to needs for physical education in the school programs of the day. There were those, however, who were strongly opposed to this philosophy. One of the best known of the so-called naturalists, who led the philosophical revolt against the practices in the eighteenth century, was Jean Jacques Rousseau. This noted French philosopher meticulously outlined an educational program that gave great emphasis to the development of physical stamina, strength, and coordination. The concept that it was a *human being* that was to be educated rather than a *mind* (as distinct from a body) was in direct opposition to the then current beliefs and practices.

Although Rousseau's ideas were tried in only a few private schools of his day, the ideas did not die. As cultural climates became more amenable to ideas of individualism, his concepts and others of similar direction came to be included in the design of curricula in various countries.

However, it was only through a long, complex series of social changes, including wars, political upheavals, philosophical and scientific advancement that physical education became an integral part of any educational system. As always, preparation for war continued to be one of the strong motivating forces for the inclusion of physical education in the school programs. This factor alone, however, seldom seemed sufficient for the justification of its inclusion. In most nations the increased awareness of the necessity for adequate exercise in the optimum development of children was an important consideration.

## EUROPEAN SYSTEMS

Germany and Sweden are the two countries that come to mind most readily whenever early programs of physical education in the schools are discussed. Out of Germany evolved gymnastics oriented to the use of so-called heavy apparatus such as parallel bars and vaulting horses. Friedrich Ludwig Jahn and, later, Adolph Speiss were responsible for development of much of the German System. Swedish gymnastics, largely attributed to Per Henrik Ling, were performed in conjunction with balance beams, stall bars, and other equipment of a "lighter" nature. Elaborate progressions and stipulations of proper form for the performance of exercises in both systems were painstakingly developed by their respective proponents.

At about this same period of the nineteenth century, the "public" schools of England were developing their own approach to physical education. These schools (which, despite their name, were maintained for the benefit of the aristocratic families only) stressed classical studies of language and literature as well as some science. In addition to these studies, the boys participated in a growing number of individual and team sports and games. Tennis, swimming, boxing, soccer, cricket, boating, and other activities became extremely popular at these institutions. Administrators of these schools encouraged this kind of participation not only for the physical fitness values they provided but also for the qualities of leadership, perseverence, and sportsmanship that they were believed to promote. It is noteworthy that despite efforts to popularize the formal European gymnastics programs in England, the populace never accepted them with the enthusiasm that they retained for their sports and games.

Today, as we look around the globe at the various systems of physical education as they are currently practiced, we can see clearly the influence of the three systems just discussed. The intensely competitive colonization not only expanded empires but also carried cultural influences, such as these favored systems of physical education, to many parts of the world.

Of course, the cultures into which systems were introduced determined whether they would be successful in meeting the needs and desires of the people of the culture involved. In America, for example, both the Swedish and German systems were introduced into the school systems at approximately the same time; both enjoyed some success. It is apparent today, however, that the predominant influence in American schools is that derived from the British society. It is clear that the nature of a people combines with prevailing economic and political conditions to produce educational practices. The United States has adopted a blend of the European systems to which it has added its own unique modifications. This is not to say that there is any such thing as a *national* curriculum in physical education. Surely many regional and local variations persist, both in regard to type of activity and quality of program. Generally speaking,

Courtesy Adidas

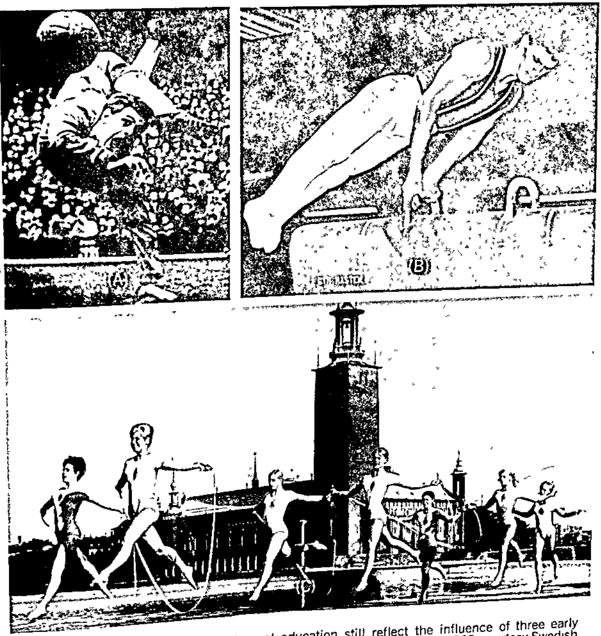



**FIGURE 3.3** Modern programs of physical education still reflect the influence of three early systems: (A) English, (B) German, and (C) Swedish, picturing the Sofia Girls, 1968, courtesy Swedish Information Service.

however, programs of physical education in this country are built around the sports-and-games concept. Criticisms regarding the alleged inadequacy of such programs for the building of adequate fitness levels have been met by the addition of more formal types of activity to existing programs, in most cases, rather than a change in emphasis and replacement by activities designed strictly for the development of physical fitness.

## TODAY'S PHYSICAL EDUCATION

If we discount the remarkable culture of the early Greeks, we can see that physical education is really a very recent development in man's history. When we stop to consider that the earliest systems of physical education were introduced into the schools only about 150 years ago (and less than 100 years ago in the United States), it is apparent that we are dealing with a very young aspect of education. When we then look at the changes that have occurred in the world within the last 100 years as compared with all that have gone before, it is not surprising that there are differences of opinion about what the main purpose of physical education should be in America and the world.

### THE FUTURE

There is little doubt that the next ten years will be critical ones for physical education in the United States. We will be facing problems that man has never before encountered. The role that physical education is to play in the lives of people will be determined by a great many factors, including social preferences, educational aims, economic goals and conditions, and political pressures. If our profession is to survive and emerge as a truly positive contributor to the welfare of mankind, physical educators themselves must become aware of:

1. The ways in which physical activity affects man and his environment

2. The ways in which man and his environment limit, encourage, and generally affect human physical activity

## CURRENT STATUS OF HEALTH EDUCATION

When we address ourselves to the question, "Where is health education today?" we naturally turn our thoughts to the questions: "Where were we?" and "How long has it been since we were there?" Investigation leads to two somewhat striking answers to the latter questions: "It was awfully dark and bleak where we were and it has been less than a hundred years since we were there." To put it another way, health education is "young," and it has grown and developed tremendously since its earliest beginnings about 1870, when it was nothing more than a temperance and antivice program with some anatomy, physiology, and hygiene thrown in for good measure.

### EARLY PRACTICES

Ancient societies, including the Chinese, Egyptians, Hebrews, Greeks, and Romans, including a period from about 3000 B.C. to A.D. 1700, were concerned to some extent about physical well-being and stressed certain rules for hygienic living. Emphasis was placed most commonly upon "physical" health and well-being and the absence of disease. Horace Mann, in 1840, stressed the importance of physical well-being and "educating for health," (188, p. 14)

but was largely ignored. The public health movement in the United States began in 1850. At that time city governments began to establish and upgrade health departments as a direct result of Lemuel Shattuck's *Report of the Sanitary Commission of Massachusetts* (188, 223). In this report, Shattuck described a modern program of public health—especially preventive programs—and gave impetus to the idea that health was more than absence of disease. Perhaps of even greater importance were his suggestions for *health education.*

Ohio instituted a state program in 1872; it was typical of those instituted from that time until about 1918 in that it was "anti-vice and function-of-the-body" oriented as a result of the powerful temperance-sponsored propaganda movement. Health as it is now conceived was not emphasized until sometime after World War II.

We can approximate the progress of health education from the early 1930s to the present by perusal of several typical health texts for college students. Williams' (609) fourth edition of *Personal Hygiene Applied,* for example, was published in 1931 and included several chapters on the meaning of health, the health problem, man in society, the approach to health knowledge, and science and attitudes, all apparently directed at setting the mood for effective learning. The remainder of the text was devoted to "the hygiene of" each of the major systems of the body and to nutrition, the mouth, eye and ear, and "sexual aspects of life." One chapter was devoted to "prevention of specific diseases." Hygiene and the study of body function was still in vogue in 1931, but *eleven* small-size pages were devoted to some sex education!

By the mid 1950s there was less emphasis on the systems of the body per se. See, for example, Kilander's *Health for Modern Living* (310). Personality and mental health, dating, courtship and marriage, growth and development, nutrition and weight control, relaxation and recreation, study of stimulants and depressants, alcohol and tobacco, more extensive treatment of disease, planning medical protection, and national health resources were now typical of health education content.

## TODAY'S HEALTH EDUCATION

In the mid 1960s we apparently had returned to some emphasis on the function of the body's system per se and some effort at defining the importance of health education. In Miller and Burt's *Good Health* (390) we see that physical fitness was added and that there was more extensive treatment of sexuality and reproduction. Family planning appeared, and strong emphasis on problems related to tobacco, alcohol, and narcotics was continued. Consumer health appeared on the scene, as did greater emphasis on *community* health and personal appearance. Some coverage of emergency first-aid procedures and a discussion of radiation dangers were also included.

Another development has been health education's recent trend in the

direction of the conceptual or "big ideas" approach to learning. Perhaps it is too early to call this a trend, but considerable time and money was spent on the development of a conceptual model for school health education, and it appears most likely that the approach will be more and more utilized. The approach is based on the precept that the "big ideas" or basic concepts are better retained and assimilated than are facts. There are three key concepts: growing and developing, decision making, and interactions. The new terminology may be somewhat misleading, but when we turn to the ten concepts subsumed by the three key concepts, the picture becomes clearer. These ten concepts are listed in Table 3.1. Categorized under each of the ten concepts there are from two to four substantive elements, a total of thirty-one of these in all. The curriculum then is organized around these substantive elements in terms of goals for the learner and behavioral outcomes at a particular developmental or grade level.

There is yet another bit of evidence that leads one to believe some health educators have awakened. The *ideal* approach is no longer viewed as the textbook and lecture method; there are problem solving and experiments (as well as the older movie-film, posters, pictures and television methods). Although the idealistic new programs are not yet widely being used, the fact that they are being utilized at all is encouraging.

## THE FUTURE

As a final note and fitting close to the discussion of the question, "Where is health education?", let us say "not where it *has* been (fortunately!) but not yet where it can be." To be sure, there are encouraging signs as we have pointed out. But every school does not yet teach health as it should be taught (too many still do not teach it at all); and the

**TABLE 3.1 Ten Concepts for Health Education**

| |
|---|
| Growth and development influences and is influenced by the structure and functioning of the individual. |
| Growing and developing follows a predictable sequence, yet is unique for each individual. |
| Protection and promotion of health is an individual, community, and international responsibility. |
| The potential for hazards and accidents exists, whatever the environment. |
| There are reciprocal relationships involving man, disease, and environment. |
| The family serves to perpetuate man and to fulfill certain health needs. |
| Personal health practices are affected by a complexity of forces, often conflicting. |
| Utilization of health information, products, and services is guided by values and perceptions |
| Uses of substances that modify mood and behavior arise from a variety of motivations |
| Food selection and eating patterns are determined by physical, social, mental, economic, and cultural factors. |

SOURCE Health Education. A Conceptual Approach to Curriculum Design. Washington, D.C., School Health Study, 1967, p. 20

conceptual model is still just that—a *model*; the test is yet to come—can and *will* these dynamic new ideas in health education be utilized effectively?

## THE DEVELOPMENT OF RECREATION

### EARLY BEGINNINGS

The concern over the problem of learning to deal with leisure has sprung from several sources. Americans tend to believe that the phenomenon of free time is unique to the modern, industrialized societies. You may recall that the ancient Greeks (and the Egyptians before them) had a great many festival days during the year and that the Romans are reputed to have had nearly as many holidays as workdays. It is generally conceded that the failure to wisely utilize this time was a contributing factor to the downfall of the Roman empire.

Of course, festivals and religious holidays are only one means of assessing the degree of recreation engaged in by ancient societies. There is no doubt that man has always been compelled to play. "Abolish religion and recreation from the face of the earth and within two moons they would return again" (72, p. 106). Both of these activities involving man's attempts at self-fulfillment and search for meaning have played significant roles in the development of civilization. Recreation is a means of dealing with boredom, and it is clear that much of the leisure of man has been spent in imaginative ways of meeting challenges presented to him by his culture.

Although recreational pursuits must have persisted among common people during the Dark Ages, the available records concerning such activity deal only with royalty and Church figures. The Renaissance produced another kind of activity to be utilized during leisure, that of learning. It was during and after the Reformation, however, that the roots of the "evils of idleness" idea took hold.

The period of colonialization carried cultures of established societies throughout the world. Religious differences provided the impetus for many of the early settlers to leave Europe, and some of the persecuted groups colonizing the inhospitable new lands developed attitudes that have had profound effects on succeeding generations.

### ATTITUDES TOWARD PLAY

One of the most enduring of these attitudes was that developed concerning work. Any unproductive activity was deemed sinful. Because play and other recreational activities were obviously unproductive, they were equated with the sins of idleness and sloth and were firmly discouraged. Many of the recreational activities of that time were "disguised" by the addition of a work element. Husking bees, barn raisings, and similar events became events to look forward to with great anticipation. Even though the harsh environmental conditions were gradually controlled, the Puritan "work ethic" persisted,

and its influence spread throughout the early United States.

It is of considerable interest to note the relationship between recreation and the Church during this time. Although "play" was not permitted (or was frowned upon, at least) the religious activities became extremely popular. Lonely settlers came great distances to attend evangelistic meetings in tents or cleared areas. Accounts of these services give an indication of the extent to which religion, in a sense, became a substitute for recreation (161, p. 80).

It was not until the Industrial Revolution, however, that the American citizen (as well as the European) began to learn what leisure meant. Less time was required to meet the requirements of life, and more money became available for recreational use. The expansion of business opportunities, however, became almost a "game" in itself. Because work had always been a legitimate outlet for one's energies, the excitement of commercial competition, getting and spending, attracted the attention of many.

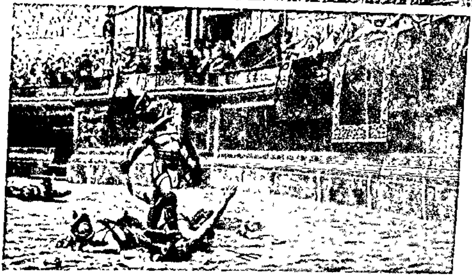
The money produced by this rush of business activity, associated with the growth of cities around industrial complexes, made possible the development of "spectating." Horse racing, professional foot racing, boat racing, and other types of competition attracted large throngs of spectators, frequently taxing the capacities of transportation and housing facilities. "Phineas T. Barnum of circus fame stands out as the leading figure of this period in amusing the populace. No struggle between dramatic standards and popular taste ever troubled the master showman of them all. He was not one whit interested in art; he was interested in entertainment" (161, p. 122). Barnum's ability to provide a vast variety of entertainment for the people of the 1850s may have had a significant effect on their readiness to pay for the opportunity of viewing athletic teams compete.

The first recorded football game between colleges was played in 1869 between Princeton and Rutgers. Three games were played, and there were twenty-five players on each side. It took a few years for the game to catch on (it was banned because of increasing roughness), but after some rules changes and after further exposure, the groundwork was laid for the establishment of rivalries that have since attracted millions of spectators.

The growth of sports not only provided people a chance to observe and to be entertained but also gave them new outlets for involvement and participation. In addition to these, activities such as bicycling and then "joy riding" in automobiles provided opportunities for fun and excitement that are still enjoyed today.

## MODERN LEISURE

The changes of the first half of the twentieth century are of little interest to the youngster who has never known anything but television, supersonic aircraft, and computer technology. He will be interested, however, in the effect that the changes produced in



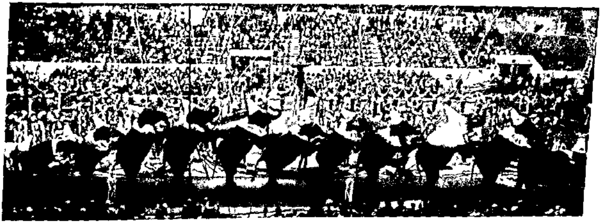


**FIGURE 3.4** Modern man is little different from his predecessors in his love for the diversion and entertainment provided by colorful and violent spectacles. (*Top, half-time entertainment at college football game; center, "Pollice Verso," 1874, by Jean Leon Gerôme, now in Phoenix Art Museum, Phoenix, Arizona; bottom, Ringling Bros. and Barnum & Bailey Circus photograph.*)

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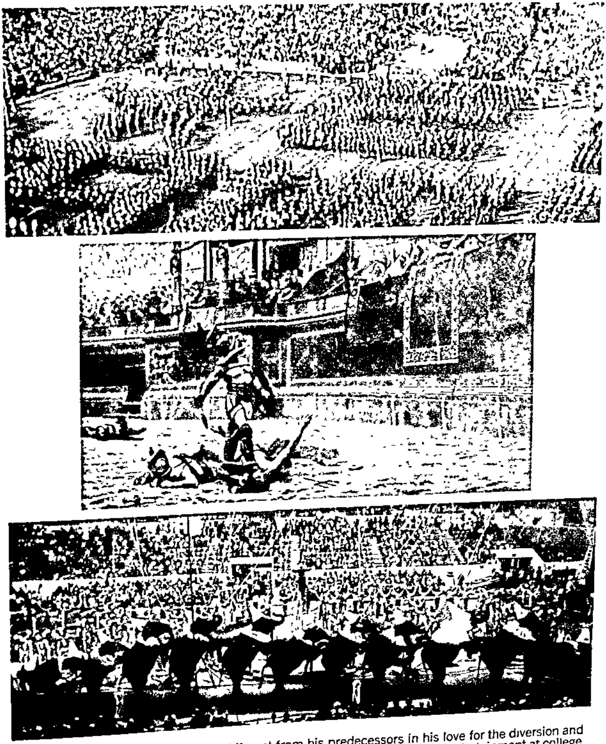

FIGURE 3.4 Modern man is little different from his predecessors in his love for the diversion and entertainment provided by colorful and violent spectacles. (Top, half-time entertainment at college football game; center, "Pollice Verso," 1874, by Jean Leon Gérôme, now in Phoenix Art Museum, Phoenix, Arizona; bottom, Ringling Bros and Barnum & Bailey Circus photograph.)

society by automation will cause in his personal life. It is precisely this kind of problem that the professional recreation worker will be trying to help solve.

## THE FUTURE

In justifying the need for recreational leaders and recreational programs, authorities point to a number of factors of which we are all basically aware. The forty-hour work week may be reduced to thirty within the next ten years. Increased wages and the guaranteed annual wage (which has become a reality for more and more people) coupled with an unprecedented production have increased the spending power of millions. Unemployment rates have seasonal fluctuations, but unemployment insurance helps to reduce the difficulties encountered during such times. The population explosion has created a housing and a school crisis in the cities. The burgeoning social expectations of minority groups have produced a restlessness and a social mobility that is unprecedented in the history of the world. The combination of increased leisure, more money, and unfulfilled expectations is expected to produce social and economic problems whose solutions will require the dedicated efforts of a great many people. We can expect increased concern on the part of government and industry as well, and not always on the basis of objective humanitarianism. Concerning the relationships of recreation to the economy, *Fortune Magazine* reported: "The leisure market may become the dynamic component of the whole economy" (161, p. 393). In reviewing publications of the amounts spent by Americans for equipment and services related to recreation (such as the *Life* article, "A $40 Billion Bill Just for Fun"), Dulles came to the conclusion that "Play had to be considered a virtue for the sake of the nation's prosperity" (161, p. 392).

### Work and Play Today

As a consequence of the factors that have been mentioned (as well as others), the concepts of "work" and "play" in our society have undergone curious changes. This change is pointed out in Chapter 17 in terms of the implications it has for physical education in the schools. It has just as serious implications for nearly all other professions.

After reviewing the research in this area, Sessoms notes:

> *Traditionally, Western man has viewed work as the major determinator of social status, but with advanced technology and mechanization, work is losing its social importance. Increasingly . . . leisure has replaced work as life's central interest.*
>
> *For many, it is not an easy transition. There are feelings of guilt and shame; leisure has been for too long synonymous with idleness, and the prestige ascribed to adult play is woefully low. Work may not be meaninfgul but neither may be leisure (506, p. 44).*

". . . neither may be leisure"—this is the problem that faces the prospective recreation professional. The task

of helping to create a new value system in which meaningful leisure pursuits are possible is a tremendously important one. It is apparent that jobs can no longer provide meaning for the vast majority of people, and it is certain that this situation will not improve.

## SUMMARY

Examination of the current status of physical education reveals a strong emphasis on physical fitness for the masses of students while a concern for the teaching of physical skills is limited to a relative few. Highly talented individuals, especially those engaging in varsity sports, appear to receive the bulk of attention given to intensive skills training.

A brief historical survey indicates that the fitness objective has long been likened to the objective for preparedness for war. While fighting and hunting skills were prized in past ancient cultures, the early Greeks stand out for their remarkable contributions to physical education as well as to all other aspects of civilization. Few if any cultures have had as profound an effect upon the modern philosophies of physical education as that of the Greeks.

Other cultures, including that of the once-proud Roman Empire and some of those rising out of the dismal years called the Dark Ages following Rome's fall, have made contributions to physical education. With the Renaissance and the Protestant reformation, great strides were taken toward regaining the levels of civilization once enjoyed.

With the advent of improved education, ideas about the role of physical activity in man's life again stirred some interest. "Systems" of physical education gradually developed around individuals and came to be identified with specific countries.

With expansion of colonial territories in the new world, these systems became incorporated, adapted, and modified to blend into the new cultural setting. The phenomenal growth of population centers, educational systems, and economic opportunity provided by our civilization has created a culture that has affected American physical education in many ways. The rapidity of growth and the absence of clear-cut goals has placed physical education in the position of being forced to justify its very existance at a time in history when it should, theoretically, be making its greatest contribution. The challenge is clear and the opportunities will be great in the years immediately ahead. Realization of the potential contribution of physical education will be dependent upon the dedication and preparation of tomorrow's physical educators.

Health education, as distinct from interests in medicine itself, is really much younger than physical education. Practices of early people, including taboos and rituals designed to preserve health, were often specified by decree or custom. Aside from scattered records, little is known about efforts to educate people concerning personal health practices.

The origins of health education in the United States as well as its evolu-

tion can be conveniently traced by examination of the content of popular health texts from the early 1930s up to the present time. Recent years have seen a great expansion in breadth of health topics as well as intensified interest in new and more effective ways of making health knowledge a meaningful factor in human behavior.

The history of recreation is as old as play itself. From a formal standpoint, however, the festivals of ancient peoples give us our first glimpse of organized recreation. Physical education and recreation suffered common fates during the Dark Ages and the succeeding years. Religion played a large part in formulating attitudes toward work and play, with the latter being, for a time, practically equated with sin.

The Industrial Revolution, accompanied by economic development and increased leisure, gave birth to an upsurge in recreational interest and activity. In the United States, these conditions contributed to a tremendously increased interest in spectator sports. Modern automation has only accelerated the trend to greater economic growth accompanied by increased leisure. The concepts of work, play, fun, job have become less and less clear as profound cultural changes have occurred with increasing rapidity.

Heavy responsibility for helping to create new value systems for an age of leisure rests with today's recreation personnel. The significance of recreation in American life within the next few years can scarcely be overemphasized.

## PRINCIPLES

1. Attitudes of a populace toward the concepts of work, play, leisure, and recreation have profound effects upon the vitality and direction of the society.
2. Failure to utilize free time in a meaningful, satisfying way can contribute substantially to the decay of an otherwise sophisticated society.
3. Historically, concern for the physical fitness of any population has been linked to the objective of military preparedness.
4. Physical education takes on profoundly different values when viewed from the standpoint of dualism (mind versus body) as opposed to monism (a single, unitary being).

## SUGGESTED READING

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# Principles of Modern Physical Education, Health, and Recreation

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Holt, Rinehart and Winston, Inc.

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TORONTO / LONDON / SYDNEY

# Preface

Our purpose in writing this book has been to provide for students planning careers in health, physical education, or recreation an introduction both to the scientific core of information about human physical activity and health-related behavior and to the philosophy, procedures, and purposes that we consider relevant for professional experience in the disciplines these students have elected to follow. We have wanted our book to serve the needs of teachers and students who are seriously involved with the very foundations of health, physical education, and recreation.

In preparing the text and assembling its supporting data and demonstrations we have been mindful of the changes occurring in education as the result of world-wide social and political turmoil, changes that have affected the professions of physical education, health education, and recreation just as profoundly as they have all other aspects of modern life.

Like all of today's college students, majors in physical education, health, and recreation reflect the strengthening of academic standards throughout the school system. They also exhibit the increased sophistication characteristic of earlier physical and social maturity. Although the complexities of modern life have multiplied the pressures placed upon them, there is little doubt that young people are better prepared than ever before to cope with the problems left to them by preceeding generations.

Today's students come to college not only academically well grounded, but also philosophically committed to idealistic goals. It is now up to the colleges and universities to give these eager young recruits the modern weapons and training they will need if they are to be successful in attacking the crucial problems they will have to face. It is increasingly clear that their success (and the survival of their professions) depends upon their ability to establish themselves in the minds of the public as *knowledgeable experts* in matters of human physical activity and health-related information and behavior.

We believe that if students are to develop an adequate expertise in their profession, they must first develop a healthy self-respect based upon pride in their *potential* professional contribution. The fostering of this desirable self-image can best be facilitated through early exposure to the true *substance* of the profession. In expressing this philosophy, we have wanted:

1. To introduce the student to his chosen profession by indicating not only what his profession is, but also what it can become.
2. To provide a practical handbook of important principles and a useful source of documented information for the use of the student throughout his preparatory training as well as for the graduate on the job.
3. To establish an integrating element that could function to help the student perceive the relationships among the many courses he will encounter during his professional training.

As a means of organizing some of the ideas contained in this book we have utilized two terms borrowed from the field of neurology. The expression EFFERENT CONCEPTS has been used to identify those ideas dealing with the effects that physical activity and health-related behavior have upon man's biological function, his social conduct, his philosophy, his art, and his culture in general. Conversely, AFFERENT CONCEPTS refer to those ideas that are concerned with how man's physical makeup, his environment, his philosophy, and his culture act to influence, modify, or direct human physical activity and health-related behavior.

As a further attempt to aid students in understanding the material presented, an extensive glossary is included. As each technical term is introduced it appears in boldface, indicating that a definition can be found in the glossary.

So as to distinguish the present effort from the earlier book entitled *Physical Education: A Problem-Solving Approach to Health and Fitness* (Holt, Rinehart and Winston, Inc., 1966), which resulted from a collaboration

with our colleagues Donald Stolberg and Maryellen Schaefer, we should like to emphasize that the 1966 work was written as a text for a new type of combined health and physical education course, one directed more specifically to students not concentrating professionally in health, physical education, and recreation. It was inspired by the idea that today's more mature, intelligent college student deserves to be given the opportunity to study and evaluate for himself the available evidence concerning human physical activity and behavior related to health and fitness.

Many people agreed that this kind of information is valuable for the general student but pointed out that it is of even greater importance for the student preparing to work professionally in health, physical education, and recreation. The obvious objection to the use of the first book for majors has been, however, that it is addressed to a different audience and fails to consider several topics of particular importance to professional students.

Thus, in this book, which is designed for majors, we have deliberately retained significant portions of the scientific content from the 1966 volume and even expanded them considerably into the fabric of the preponderance of new material making up the present text.

We would like to express our appreciation to the many fine people on our own faculty and to those at other institutions who have contributed so much to the genesis of the ideas expressed in this book. Dr. Donald Stolberg has been a particularly stimulating co-worker, and many of his ideas have found their way into this text. We are grateful to several other dedicated professionals whose imaginative work with the introductory majors' course at the University of Toledo has contributed in many ways to our writing of this book. Dr. Harriett Williams, Dr. John Drowatzky, Dr. Jack Schendel, Dr. John Burt, Dr. Jan Broekhoff, and George Gilmore have all made valuable contributions to the philosophy and content of our program at this level.

Our thanks are also extended to Dr. Marguerite Clifton of Purdue University, Dr. Marvin Eyler of the University of Maryland, and Dr. John Cooper of Indiana University, whose many sound criticisms and suggestions for changes in our manuscript have contributed to its substantial improvement.

To Dan Wheeler, of Holt, Rinehart and Winston, we express our appreciation for his enthusiastic encouragement and knowledgeable advice. We would also like to thank Jeanette Ninas Johnson for her advice, patience, and very real assistance in putting this book together.

Finally, we are grateful to our wives, June Updyke and Ann Johnson, for their loyal support, encouragement, and frequent unselfish assistance in this undertaking.

W. F. U
P. B. J

*Toledo, Ohio*
*October 1969*

# Contents

# Introduction

Times are changing rapidly. The ever increasing complexity of society demands that we expand our understanding of man and his world if we hope to survive as individuals and as civilized nations. At the same time that pleas for increased breadth of knowledge are being raised, there arises an insistence upon increased professional and technical specialization. The beleaguered student is caught in the middle.

Today's college student, whatever his major field of interest, is expected to master facts and concepts that will give him far greater expertise upon graduation than has been possessed by preceding generations. In becoming an expert, however, the student has found it impossible to pursue as wide a variety of interests as once was possible.

Few people would deny that physical education, health education, and recreational leadership have become distinct and separate professional specialties. There is simply too much of a specialized nature within each field to expect one individual to become adequately prepared in more than one of them in four years. Recognition of this fact has led to the establishment of separate curricula for the preparation of professional workers in each of these areas.

It is not surprising to discover that these curricula contain certain very important common elements, since the three professions share several of the same important objectives. All three professions, for example, are directly concerned with helping man to understand himself and his biological and psychosocial needs. All three are devoted to fostering habits and techniques that will serve not only to help preserve man's health but also to enable him to achieve a full, satisfying life.

The purpose of this book is to provide students with a summary of concepts and principles important to health educators, physical educators, and recreation leaders alike. This is not meant to imply, however, that every concept and principle discussed in the text is considered equally important to each of the professions. Neither is it assumed that all important concepts and principles have been covered, or that judgments made concerning the placement of emphasis are infallible.

We do believe that each chapter in some way provides a substantial portion of the general foundation that must undergird the more specific knowledge and skills of persons embarking on a career in health, physical education, or recreation, and that there is no concept or principle presented that does not hold significance for at least one (if not all) of these professions.

Chapter 17 (Concepts Underlying Special Programs) provides an example of material that is not of equal concern to recreation specialists, to health educators, and to physical educators. While only members of the latter group would be expected to become actively involved in physical activity programs for the atypical child in school, health educators must certainly be aware of the need for such programs and should be intimately concerned with fostering sound philosophies of physical education and recreation for atypical persons as an integral part of the total health education program. Recreation leaders will be increasingly called upon by communities to provide facilities and programs for handicapped youngsters and adults; knowledge of appropriate opportunities, as well as understanding of the limitations imposed by various conditions is essential to the provision of meaningful programs.

Other examples of mutual concern are provided in the brief sections dealing with diseases and disorders of the various systems, and those related to exercise concepts. In the case of diseases and disorders, awareness of these matters may be of pratical significance to the practicing physical educator and recreation specialist even though knowledge of such disorders may be of more direct concern to the health educator. In the second instance (exercise concepts), physical educators will regard concepts pertaining to physical activity as being of paramount importance. The potential health benefits and dangers of various kinds of exercise and physical activity will also be of more than passing interest to the health educator. The recreation leader will make considerable use of such infor-

mation in planning sound, effective programs to meet the leisure needs of the community.

As a summary of principles and a review of important concepts, it is apparent that this book is intended to go beyond serving as an introduction to the professions involved. It is hoped that as you progress through your academic programs, its pages will provide practical assistance in the development of projects and that its many references will serve to give initial direction in the search for further information for papers and presentations. When you near completion of your training, we hope this book will assist you in integrating the detailed and widely divergent aspects of your preparation. And as you begin your professional career, you will find it useful as a review of pertinent ideas and important professional responsibilities and objectives.

Because it is meant to be more than an introductory text, we have included brief sections dealing with procedures and programs. The chapters in Part IV (for example, Essential Emergency Procedures, and Selected Issues) are intended to provide some exposure to these less conceptual but nonetheless basic concerns of the true professional.

It is hoped that this book and the philosophy out of which it has developed will help to identify and strengthen the common goals of physical education, health education, and recreation leadership in order that through their separate, unique contributions these professions may fully achieve their potential for the improvement of man and society.


THE BLADE TOLEDO, OHIO
Rewarding Experience
Alcindor Working With Underprivileged Youngsters

# *PART I*

# Essential Backgrounds

# The Prospective Professional

## Chapter 1

### VITAL QUESTIONS

"Why am I here?" "Why have I chosen a career in physical education—or health—or recreation?" These are questions that each person should ask himself early in his educational career.

There are, of course, any number of possible answers to such questions. However, the nature of these answers may be of vital importance to you and to your profession as well.

Some categories into which typical answers fall are:

1. The desire to pursue personal interests and aspirations; to do something one enjoys.
2. The desire to influence the behavior of others; to achieve acclaim or status.
3. The desire to be of service to others who need assistance.

It is obvious that one's motives might involve all of these desires. It is equally possible, however, that a given individual might enter a profession primarily motivated by one of them. It is conceivable, for example, that one might choose to become

LEW ALCINDOR
*Finds youth stimulating*

# Rewarding Experience

★ ★ ★ ★ ★ ★ ★ ★ ★

## Alcindor Working With Underprivileged Youngsters

NEW YORK (AP)—Lew Alcindor, who could now be getting ready to lead the U S. basketball team in the Olympics, is working instead with the underprivileged youngsters of New York.

"I don't know of anything I've done yet that's been more rewarding," he says "We know what we've done has worked. It's been that good. It's wonderful."

This is the same man who not long ago said of his decision not to try out for the Olympic basketball team:

"We have a racist nation and my decision not to go for the Olympics is my way of getting the message across."

Alcindor, the 7-foot plus center of UCLA's **collegiate** champions and already considered one of the greatest of modern basketball players, was a cinch to make the Olympic team.

He is now part of Operation Sports Rescue along with other famous athletes. Teams each headed by an athlete talk to youngsters in small groups.

"Young people idolize athletes," says LeRoy Wilkins, director of the project. "If you can get athletes to say the same thing that religious leaders and educators are saying, they'll listen."

The objectives of Operation Sports Rescue are to instill self-pride in youngsters of the street, to impress on them the value of remaining in school, to underscore the value of independence by acquiring marketable skills, and to encourage youngsters to take an active part in community affairs.

Among the athletes working on the project in addition to Alcindor are Emmette Bryant of the Boston Celtics, Ron Blye of the New York Giants, Tom Hoover of the Houston Mavericks, Bobby Hunter of the Harlem Globetrotters, Carlos Ortiz and Jose Torres, the boxers, Oscar Robertson of the Cincinnati Royals, and Walt Bellamy of the New York Knicks.

"Alcindor has worked almost as much as all the rest put together," said one of the project officials.

Operation Sports Rescue is sponsored by the Mayor's Urban Task Force and financed by the Bristol Myers Co

**FIGURE 1.1** As they become mature, most great athletes become interested in identifying with a "cause" that is greater than self. (Copyright AP; photo, World Wide Photos.)

a health educator because he loves biology or immunology. A love of history might lead another to become a history teacher. A successful high school athlete might choose to enter physical education because he loves sports competition.

The question is, have we chosen this profession because we wish to prolong pleasant experiences in our own lives, or is it that we wish to extend to others the benefits of enjoying for themselves the kinds of experiences we have found meaningful and pleasurable?

Maturity brings changes in philosophy and objectives. It has been said of the typical athlete that when he is young, he wants to be *good*; as he grows older, he wants to be good for *something*. This increasing awareness of the influence that he can have on others through his athletic achievements can lead him in many different directions. Figure 1.1 illustrates the fact that many people who have achieved athletic fame find even greater rewards in forgoing the pursuit of further public acclaim in favor of giving of themselves to others who really need help.

It is doubtful that maturity can be gained by any means other than personal experience. Therefore, the only real justification for pointing out the matters discussed in this chapter is that responsible decisions (if and when they are made) depend upon the avail-

ability of accurate information. On the other hand, if one is to really profit from his educational experiences, he must approach them with a sense of perspective that makes the various courses take on meaning.

At the very beginning of a career it is important to have a serious talk with oneself. It is important to make some definite decisions now (painful though the process may be) about what your real goals in life are. In making these decisions you are really spelling out your philosophy of life. Do you wish to serve others or to be served? Are you anxious to become a coach or teacher or recreation leader in order to be in a strong position to exert an influence in the lives of youngsters, or does this kind of life appeal to you because of the opportunity it gives you to stay in the environment you love? Steinhaus has said that the person who is interested in getting the most dollars does not have the instincts of a teacher (543, p. 256). This does not mean the teacher should not expect fair remuneration for his expensive training and important work. It does mean that if his goal is the gathering of material goods, he does not really have the capacity for putting other people's welfare ahead of his own.

At this point it should be pointed out that no good coach or teacher is entirely unselfish in his motivation. Of course he is fond of the subject he is teaching. Of course he loves the excitement of hard fought contests. But he recognizes that these experiences must be directed toward meeting the needs of the youngsters rather than meeting his own needs. In other words, the truly *professional* person recognizes that his primary responsibility is the improvement and nurture of the student; the


FIGURE 1.2 "Maybe I ought to become a surgeon . . I've always enjoyed cutting and stitching"

professional's own enjoyment and even his professional advancement must be secondary considerations. And certainly neither his enjoyment nor his advancement are ever to be attained at the expense of his students.

In learning to subjugate one's own selfish interests to the best interests of others, many people have found unexpected rewards. No one would deny the thrill to be gained from putting a team of talented performers together and guiding them step by step to victory. Even more gratifying, however, can be the experience of developing the capacity to analyze the subtleties in complex performance and then to creatively utilize this knowledge in producing performers when there were apparently no performers. Anyone can slavishly initiate the systems of others, but what could be more soul satisfying than being the originator of a concept, system, or idea? Anyone should be able to win with good material, but what can be said of the man who can win with players who began as only mediocre performers? And what of the person who uses his influence to expand the creative imagination of an "ordinary" child? That man has the qualities of a *teacher*!

As soon as one begins to direct his thinking in terms of his profession as a service to others, it becomes obvious that the number of youngsters he can help is much larger than he may have realized. Although interscholastic athletics can directly involve a few elite performers, all of the students in a school system profit from a well-conceived program of physical education. Because the life of a normal child is intimately bound up with physical activity, physical educators, recreation leaders, and health educators take advantage of every opportunity to utilize natural urges and desires in achieving a variety of worthwhile educational objectives. However, this must not be understood to mean that such objectives will automatically be achieved. We will have a great deal to say later on about the necessity for careful planning and preparation, if *any* of the potentially valuable outcomes of physical education, health, and recreation are to be realized.

## INTERRELATIONSHIPS OF THE PROFESSIONS

To someone who has thought of physical education only in terms of the opportunities it provides for the teaching of motor skills and coaching, it may not be clear what physical education has in common with health education or recreation education. On the other hand, if it is recognized that regular physical activity of appropriate kinds has a profound effect on the physical welfare of all people in terms of growth and development and on the prevention of certain degenerative diseases, it becomes obvious that the positive health of people ("preventive medicine") is a common objective of both physical education and health education. Furthermore, the kinds of activities we engage in during our leisure hours, the types

of diversions we pursue as a means of maintaining our sanity in times of stress, are mutual concerns of all three professional areas. Certainly all three are ultimately concerned with the well-being (physical, mental, and spiritual) of the individual. The means utilized in the attainment of these lofty objectives may vary considerably, and the place within the community where these objectives are sought may also be different. But to the extent that all three are concerned with frequent use and knowledge of physical activity in meeting the physical, mental, and spiritual needs of human beings, they are related.

It is also important to recognize that because of the fact that physical education, health education, and recreation are all concerned with the effects of their programs on man's welfare, they all require training and background in the physical and psychological makeup of man.

Certainly it would be foolish to presume that there are no major differences in the three programs under discussion. Although there may be even greater differences developing as changes occur in our society, there are still sufficient similarities to justify a common core of early training experiences. For this reason it is assumed that the readers of this book will represent all three professional areas, and it is hoped that even though illustrations and examples may be taken from one or another particular field, it will be realized that the principles involved are intended for physical educators, health educators, and recreation specialists alike.

## THE QUESTION OF "MEANING"

After Hillary first conquered the terrifying heights of Mount Everest, he was asked why he would take such terrible risks and subject himself and others to such hardships in order to reach the top of a mountain peak. His famous response of "Because it is there!" seems, somehow, unsatisfactory. To most of us, sports, games, and other vigorous activities are *means* to the achievement of some goal rather than *ends* in themselves. Sometimes our actual purposes or goals may not be clear even to ourselves, but generally we can identify some motive for our actions such as the physical challenge involved, love of competition, desire to excel, better health, fitness needs, or, simply, the pleasure derived from success.

Because it is possible to derive different kinds of outcomes from a given activity, it becomes necessary for the educator to decide what specific outcomes he wishes to produce. How does one go about deciding what his specific aims are? Or should one simply provide instruction in the desired skills and give people the opportunity to participate and let *them* worry about the outcomes of this kind of behavior?

In physical education, for example, there are teachers who have no desire to get involved in the questions of "meaning" in physical activity. Their only concern is to teach people *how* to perform certain activities. The development of skill is their ultimate and only objective. Whether or not the learner continues to utilize the skills, whether

he derives any social, psychological, or physiological benefits, or whether he understands that there may be some such benefits are of no concern to this individual.

On the other hand, there are teachers who are deeply concerned about the values that students may be developing through participation. These teachers spend considerable time and effort in organizing their instruction so that skill development is accompanied by the acquisition of physical fitness. They strive to be certain that students understand the benefits and limitations of specific activities in terms of fitness and other factors. These teachers are concerned with the function of physical education in the total educational picture. These two types of teachers (those concerned with "meaning" and those not) are representative of two divergent philosophical viewpoints that characterize not only physical education but also health education and recreation.

## TECHNICIAN OR PROFESSIONAL?

To view the physical educator, health educator, or recreation leader as a technician means that he deals primarily with techniques. There is no implication that the *quality* of his work is inferior. There are excellent technicians and there are poor technicians; their distinguishing characteristic is that the *scope* of their activity is comparatively narrow. The technician's responsibilities are limited to the actual implementation of a program. He *administers* the activities that are set up by someone else. In some cases he may actually select the activities in his program, but this selection is based on the fact that they are being used by someone else. In short, the technician is concerned only with the practical matters of getting the program across to the students. He is not really concerned with *why* particular activities are presented at a certain level in the curriculum. The *theoretical* aspects of the function of his profession are neither his concern nor his responsibility. Someone else makes the decisions about what is "good."

The philosophical considerations and analytical processes that go into determining *why* the technician is teaching what he is teaching are the hallmarks of the professional. He must have the depth and breadth of knowledge to understand the needs of people and the means by which these needs can best be satisfied. He must be able to critically evaluate the effects of his program and make appropriate revisions. His *number one* characteristic is capacity for critical thought and analysis. He must be able to answer the question "Why?"

It is probably true that some people are more suited to the role of the technician than to that of the professional, and vice versa. It is apparent, for example, that most athletic coaches are technicians. How many different offensive formations or systems are in use in football today? Presently, the I formation (in which three backfield men line up directly behind the center and in which the fourth splits out to one side or the other as a potential pass receiver) is coming to the peak of its popularity. A few years ago nearly every

team in the country was using something called the split T. Prior to that we had the T formation that "revolutionized football." The old single wing is now nearly forgotten, and many players today have no idea how it would operate. Yet there was a time when it was considered the ultimate weapon of the game. (Similar "band wagon" phenomena could be identified in health education and recreation.)

Why do these changes occur? Do they just happen by coincidence? Is it a kind of spontaneous combustion? Or is there someone, somewhere, who has carefully studied the structure of the game and has analyzed, on a theoretical basis, the effects of certain kinds of action?

Why is there such widespread adoption of certain systems, to the exclusion of almost all others? Is it because the newest is the best? Could it be that when a famous college or professional coach is successful with a particular system, others rush to its adoption simply because he is successful with it? Are such innovations studied carefully with respect to the ability, size, or maturity of the players who are expected to execute them?

The coach who is a true professional fully understands the capabilities and limitations of his players and *creates* or *adopts* a system to fit these criteria. In order to create something new he must, of course, have some understanding of mechanisms, psychology, and even human anatomy and physiology. (Effective blocking technique, for example, is dependent upon factors in each of these categories.) Of course, the mere *possession* of a storehouse of knowledge is not enough. The ability to *use* this knowledge in unique ways is essential if one is to be a true professional in any career. Creativity and the ability to think critically are indispensable assets.

The question now becomes, should physical educators, health educators, and recreation leaders be expected to function primarily as technicians or primarily as professionals? Is there room for both? If so, how does one decide which to become? And if one decides to become an excellent technician (as a teacher of skills, for example) what assurance does he have that after a few years he will not wish to move into a position requiring the background and training of the professional?

Some schools have attempted to solve this problem by training at least all majors as potential professionals. Other schools have been content to concentrate on techniques and skills, assuming that most teachers and leaders will be functioning at the technical level.

Other professions have recognized a need to provide separate training programs for technicians and professionals. Medicine, for example, has the curriculum for the M.D. as well as the medical technician. Each is thoroughly trained in his field, but there is no expectation that the technician will ever be interested in assuming the responsibilities of the "professional." At the same time it is also assumed that the technician will be highly proficient through excellent training and diligent practice of his particular specialty. In other words, the assumption is that the jobs of the physician and the medical technician are *different*, requiring dif-


FIGURE 1.3 Examples of the "bandwagon" effect of certain attributes that often seem to gain uncritical approval because "everybody's doing it": (A) health movies, (B) jogging, (C) isometric exercise, (D) steam bathing.

taught. They must rely on the skill and know-how of the technician to supply them with reliable information on the patient. It is obvious that an incorrect diagnosis due to either faulty judgment or unreliable information could be disastrous to the patient.

Thus, medicine has learned to handle many of its rapidly growing problems by a division of labor. A relatively few people are educated in the theoretical "whys and wherefores" requiring ex-


(C)


(D)

tensive background upon which understanding and judgment can be built. A great many people are recruited for training in the important, time-consuming laboratory tasks required in today's medical practice. The physician, with his theoretical knowledge, can then decide what procedures are necessary and can direct certain treatments that are then carried out by those who are primarily trained in the intricacies of the techniques involved.

There are signs that public education is following the lead of medicine. The preparation of the subject-matter *specialist* is being advocated; such specialists would act as "master teachers" and would determine what is to be taught and the sequence in which educational experiences would appear. The responsibility for determining what the "patient" needs and in what doses the prescription is to be administered would belong to the master teacher.

He would be the planner and coordinator. Teachers with less background but with very specialized training would complete the team. These team teachers would then be responsible for implementing the courses; that is, they would do the actual teaching.

This pattern, or modifications based on the team teaching principle, has been proposed for physical education and health education as well. The problem of what training the master teachers should have as compared with that required of the other team members has not been solved.

It is at this point that the medical analogy breaks down. In medicine the professional, with his mastery of physiological and pathological considerations, has been carrying the load for years. It is only recently that the technician has come onto the scene to aid him in doing a better job for society.

In physical education the *reverse* is true. For many years the vast majority of physical educators have been trained as technicians. They have been trained in the physical performance of skills and in techniques of teaching others how to perform the skills. But where is the professional who can provide the "diagnosis" of what skills students need and at what age and in what sequence? Where is the professional who can state, with authority based upon unimpeachable fact or logic, which of the benefits claimed for physical education are fact and which are myths or old wives' tales?

Only very recently have our universities turned their attention to the preparation of experts in study of human movement in all of its specialized ramifications. Only recently have programs sprung up for the education of specialists in the fields of exercise physiology, community health problems, consumer health, recreation and aging, psychology of motor learning, sociology of physical activity, recreation for the handicapped, philosophy of physical education, and other related subjects.

The rapid development of the attitude that we need to have experts to study and understand the "whys" of physical activity has caused considerable controversy within the profession. There has not been universal agreement as to exactly what the major objectives of physical education should be.

## SUMMARY

It is important for the student in health or physical education or recreation to closely analyze his motives for choosing his prospective profession. While curiosity about or *personal* interest in a subject may be sufficient reason for embarking upon some careers (astronomy, engineering, computer programming, automobile racing, and so on), success as an *educator* must be based upon an interest in people, not as objects to be studied or used, but as human beings to be helped. Such a focus of interest demands no less scholarship, however, than a more selfish approach. But it does modify the uses to which scholarly knowledge is applied.

While the three fields of physical education, health education, and recreation are distinct entities, they do have

*ally and socially fit citizens through the medium of physical activities which have been selected with a view to realizing these outcomes (79, p. 40).*

Eight years later Bucher's definition had not changed substantially, but several pages were devoted to the development of an appropriate understanding of education in general.

*. . . when you add the word* physical *to* education *you are referring to the process of education that goes on when activities that develop and maintain the human body are concerned (80, p. 17).*

Such views differ little from that presented by Hetherington over fifty years ago. He defined *education* as a lifelong process in which the individual's powers were developed "and adjusted to a social order for complete living." He equated physical education with fundamental education and suggested that it provided the basis for all the rest of education (176, p. 115).

In 1910 T. D. Wood and Clark Hetherington began writing about "the new physical education" as a broadening experience in the lives of students. Wood concluded that "physical education should occupy itself with a program of activities which would foster physical health, but they should be considered as by-products while the pupil was being guided toward the acquisition of mental, moral, or social benefits" (176, p. 115).

Despite some widespread insistence upon narrowing the objectives of physical education to those of "preparedness" during and following World War I, the focus of physical education during the first half of the twentieth century was on the broad contributions that could be made to the development of good citizenship. As wartime emergencies and cold-war pressures persisted, the fitness objective periodically waxed and waned in prominence, but "there is little doubt that the idea of physical education as a contribution to 'education for complete living' has been the dominant theme of the field since the early years of the twentieth century" (176, p. 122). Physical education proclaimed its value in terms of the contributions it could make to the "total education" of the individual "through the physical." As a specific medium of education, it could (and did) claim widely diversified objectives accumulated from the procession of educational theories that have influenced education since 1900.

One of the great difficulties encountered in trying to state the nature of the profession lies in the nature of the term *physical education* itself. One of the great early spokesmen for physical education, Jay B. Nash, has said that the word *physical* is a misnomer because it implies that there is some sort of inherent conflict between physical and mental activity (418). The idea of "educating the physical" has long been dismissed because it is self-contradictory. Still persisting, however, is much of the original confusion that has always accompanied the use of this term. Nearly thirty-five years after Nash's time, despite suggestions by many leaders that the name of the profession be changed to reduce confusion,

the old problem is still with us. In 1967 Janet Felshin wrote: "The name itself is unfortunate, of course, because it explains nothing. We know—unless we wish to deny overwhelming evidence to the contrary and claim a dualism of mind and body—that the 'physical' cannot be educated, and even if it could be, as programs of physical education have long seemed to suppose, what would such an education mean?" Felshin goes on to point out that a true discipline must be defined in terms of its unique subject matter.

*Physical education has been explained not as the "study of . . ." but as the "teaching of . . . ," which has resulted in the paradox of an academic discipline in colleges that is defined by curriculum in schools (176, p. 140).*

No one would seriously suggest that by merely changing the name of our profession could any of these problems be solved. On the contrary, the changing of the name would merely be a reflection of the changes in the concepts of physical education that are presently occurring.

If we are to survive as an effective, contributing, educational agency, we must accept the obligation to become experts in the unique subject matter of our profession: *human physical activity* in all of its ramifications and implications. The current emphasis is on determining logical boundaries for the discipline. Although agreement has not yet been reached on details, it seems evident that our profession is moving rapidly toward defining its overall concern in terms of "man in motion." Thus, the study of man as a *moving* being becomes the focus of the profession, and all aspects of human movement become the unique domain of its members. The physiological effects of physical activity (or lack of it), the sociologicial implications of sports and games, the mechanical efficiency of motor skills, the psychological effects of participation, as well as the esthetic aspects of movement as represented by the dance (but not limited to dance) would all be legitimate parts of the discipline. Study would be devoted not only to the effects of movement (or exercise) on the life and welfare of the individual but also to the effects that the various forms of movement activity have on his surroundings and his culture.

It should be evident that in this system the educational aspects of human movement (including the preparation of teachers, skill instruction, and coaching) would be only a part of the profession's concern. Study of the movement-related phenomena for their own sake, regardless of any practical applications, would be a legitimate pursuit of scholars. Conceivably, some people would find positions in industry, the arts, government, and other environments on the basis of their expertise in exercise or movement.

## NATURE OF HEALTH EDUCATION

The term *health education*, in contrast to *physical education*, enjoys much greater universality of definition. The term *health* is itself more broadly conceived now than formerly. Instead of the old

negative concept of "freedom from disease and infirmity," it now carries a positive connotation: good health is a "state of complete physical, mental and social well-being" (500). Thus *health education* is defined as "the process of providing learning experiences which favorably influence understandings, attitudes and conduct in regard to individual and community health" (410, p. 7).

Health education is typically viewed as part of a more diverse school health program that also includes health services to pupils and a program of healthful school living. In small schools, especially elementary schools, there is usually no health education specialist, and all three phases of school health are distributed among the teachers and administrators. There is usually no school nurse, and health appraisal is limited to yearly hearing and vision testing by a visiting school nurse or some other trained person. Larger schools, especially high schools, are more likely to provide a resident school nurse who is responsible for most of the services such as referral, caring for sickness and injury while at school, appraisal, and so on. Such a specialist is also usually responsible for evaluating and upgrading healthful school living, often in cooperation with the health educator. Apparently, more large secondary schools are providing full-time health education teachers, even though a recent survey shows that there are still few health teachers who are strictly full-time; only about 7 percent of all health teachers for grades 9 through 12 are full-time in health education (500).

Although, in one recent study, over 50 percent of all "large" schools sampled in grades 9 through 12 offered a separate health education class, only 25 percent required health education for all grades 9 through 12. These percentages are slightly different for medium-sized and small schools. Interestingly enough, more medium-sized school systems required health instruction (37.5 percent) than did large schools, and small schools were very similar to large ones in this respect (24.9 percent) (500). All too often the health educator's "other" responsibility is coaching. Experience has shown that this is often not the best combination of responsibilities, and it is usually the health education that has suffered. The professional health associations are concertedly attempting to change this situation. There is little question that well-trained, full-time health educators are needed to carry out most effectively the objectives of the new health education.

Health education cannot be handled by a technician. It is multidisciplinary in nature. Its content is "derived from medicine, public health, and the physical, biological and social sciences" (500). It covers diverse areas from the nature of disease to marriage and parenthood. Modern health education methodology draws from the behavioral sciences. The nature of today's health education is such that programs must be implemented and conducted by well-trained professionals, not part-time or, for that matter, full-time teachers who are trained only as technicians (see pages 12–16).

In summary, health education is:

1. Multidisciplinary in nature
2. Dynamic (growing and improving) in nature

## THE NATURE OF RECREATION

"The most dangerous threat hanging over American society is the threat of leisure . . . " (161, p. 390). "The darkest threat to the well-being of the working man and the subject of increasing concern on the part of organized labor" is the burden of leisure (161, p. 390).

These grim statements from responsible leaders leave little doubt about the urgency of preparing Americans to cope with leisure. The problem of leisure in American life is intimately bound up with our consideration of recreation. This is not to imply that leisure and recreation are the same thing but to imply that it is difficult to consider recreation in any setting that does not involve leisure.

### DEFINITIONS

There is no universal agreement about the definition of leisure. It has been claimed that no real definition can be given. One of the problems is that the term is used to describe a block of available time, a feeling about obligations or lack of them, a tool for social control, an opportunity for self-improvement, or as a part of a work-rest dichotomy. It has been stated that the term should really be a verb, "to leisure," implying that some kind of a conscious process is going on (4).

The traditional definitions of leisure regard it as a block of time. This time is distinct from that spent in work or preparing for work. Even this concept, however, has its problems.

*Work is something to fulfill yourself with. Work is something you love to do, not something you do with your eye on the timeclock. . . . A job is different. We have replaced the concept of work with the concept of the job. A job is something we give as little of ourselves to as possible and try to get as much for as we can, and try to get away from as soon as we can. . . . I don't use the term "leisure." I use the term "work" as I'm going to use the correlative term "play." It is work in the old sense which we need to recapture, work that gives us buoyancy and a feeling of expressiveness, work which we may do while we're making a living, but also that we may do off the job while we're making a life . . . .*

*I suggest that there is something very different from fun. There is play . . . Play is something which is totally expressive but doesn't end in a product. It doesn't have to end in a product. It is a thing in itself, worthwhile in itself" (335).*

Another has made the distinction between work and play in other terms:

*Work is the main course, the meat and the substance of our lives. Recreation is the dessert; we like it best in modest portions at the end of a good meal. When we try to substitute the dessert for the meal itself, we lose our taste for it (72, p. 23).*

Kelso and Adler stated the relationships among work, leisure, and play this way:

> *Play, like sleep, washes away the fatigues and tensions that result from the service occupations of life, all the forms of labor which produce the goods of subsistence and all the leisure activities which produce the goods of civilization. Play and sleep, as Aristotle pointed out, are for the sake of these services and socially useful occupations. Since the activities of leisure can be as exacting and tiring as the activities of toil, some form of relaxation, whether sleep or play or both, is required by those who work productively (300, p. 17).*

Brightbill has defined "play" as "the free, happy, and natural expression of animals—especially the human animal . . . When we refer to adult activity," he continues, "play might more fittingly be called *recreation*" (72, p. 30).

It is clear that when we refer to recreation we are not indicating any particular activity or class of activities. That which is work for one can easily be regarded as recreation by another. There is another important distinction to be made with regard to this term. Whereas recreation up to this point has been discussed in its general connotations, we are particularly interested in it as an organized service profession. Perhaps the term Recreation Education, or Recreation Leadership would be more appropriate in this context. In any event, we will need to look at both the general nature of recreation, its history and cultural implications, as well as at the systematized structure that has been created to deal with the leisure time activities of human beings.

## PROFESSIONAL OBJECTIVES

### OBJECTIVES OF PHYSICAL EDUCATION

It has been mentioned that regardless of the philosophical winds that have blown through physical education over the years, certain objectives have consistently retained a prominent place in the overall aims of the profession. Two of these are, of course, health and physical fitness. Because these particular objectives have persisted, it must not be assumed that they are universally accepted as being the most important objectives. Because disagreement about the relative importance of particular objectives is inevitable, it is impossible to make any list of primary and secondary objectives that will be satisfactory to the entire profession.

On the other hand, it is possible to group most of the commonly held objectives into a few descriptive categories. This has been done in a great variety of ways, some more detailed than others.

*Organic development* is generally considered to be of importance. This would include, among other things, the maintenance of health through good health practices and the development of physical fitness including sufficient strength, circulo-respiratory and muscular endurance to avoid excessive fatigue and to insure adequate energy levels. Although the development of sports and recreational skills is usually covered under a separate heading of *neuromuscular development*, it too could be considered one of the organic objectives.

*Social development* is another objective that is universally listed. The ability to function effectively with others and in groups is usually considered an important outcome to be sought through physical education. The emotional control that may be learned as a part of participation in games and contests is considered important. The acquisition of the qualities of cooperation, leadership, and related factors is also valued.

Closely related to social development is the objective of *psychological development.* Subsumed under this heading would be such things as improved personality characteristics, self-confidence, self-respect, and opportunity for self-fulfillment and self-realization. Frequently included in this category are claims that physical education contributes to the generalized learning abilities of the child. A few schools have deliberately designed their curricula with this objective uppermost in their thinking.

The *cognitive objective* (sometimes called *intellectual development*) is that traditionally stressed by teachers of "academic" subjects. Although health educators have long been concerned with helping students gain understanding of certain facts and principles, physical educators have generally limited their cognitive emphasis to knowledge of rules and strategy of sports and games. It is apparent, however, that the cognitive objective has assumed a role of major importance in recent years. Much of this book is devoted to the subject matter of physical education in the belief that the knowledge of such information is important to the welfare of professional and layman alike.

An objective that is seldom discussed is that of *philosophical development.* The great difficulty in dealing effectively with the teaching and evaluation of ethics and values is apparent. It has become increasingly apparent, however, that society is in urgent need of coming to grips with the problem of values in today's world. The question of whether sports and physical education effectively shape desirable value systems is one that must come under increasingly close scrutiny. The quality of the professional leadership available is obviously crucial to the attainment of any objective; it is of particular importance in the case of realizing philosophical objectives.

## CURRENT PRACTICE IN PHYSICAL EDUCATION

Which objectives are being stressed in physical education today? Of course, if one looks hard enough almost anything can be found somewhere. On the other hand, it is frequently possible to identify trends or patterns as they emerge in response to changing circumstances over a period of time.

After World War II, and especially since the late 1950s, the physical fitness status of American youngsters has certainly received a great deal of attention. Similarly, it is apparent that interscholastic athletics (beginning even at the elementary school level in some cases) are enjoying unprecedented popularity. On the basis of these informal


**FIGURE 2.1** Physical education has taken many different forms. Widely differing emphases can be found, as illustrated: (A) modern dance, (B) sports skills, (C) physiological effects of exercise, (D) gymnastics.

living and well-being and to concentrate on the most valuable of these. This would mean that even though society may value very highly the ability of its citizens to get along with one another peaceably, physical education would not make these its major aims because many other aspects of the school program (drama, music, school government, and classroom and committee assignments) contribute to the social objectives. It would, of course, cooperate in making efforts wherever it could to reinforce desirable behavior in this regard.

Illustrations of the things that might be seen as being unique to physical education would be concerns such as physical fitness, sports skills, exercise techniques, and intellectual awareness of the physiological and psychological effects of exercise and sports participation. It should be noted that these are only examples and should not be interpreted as being an exhaustive list of the unique concerns of physical education. The only criterion required for determining whether a given objective should be placed on the list would be that of unique and ultimate responsibility. That is, if a given individual appears to have failed in the attainment of certain objectives, *to whom can he be referred for remedial action?* If, for example, a student seems continually depressed and uncommunicative despite all efforts of the instructor, he should be referred to the school psychologist. On the other hand, where does the instructor send the youngster who is chronically low on the physical fitness scale? The fact is that there is no one (including physicians, physiologists, and therapists) who have the training and background in this area that the physical educator is expected to have. Therefore, physical fitness is classified as one of the unique objectives. The only question remaining is whether it is a sufficiently important objective to be given priority. This decision must be made on the basis of philosophical considerations.

From the preceding discussion it should be clear that if one views physical education primarily as a tool to be used in achieving overall educational goals, then its primary objectives will change whenever changes in society's educational emphasis occur. Under such conditions physical education is a process or procedure, not a discipline, and cannot logically have any objectives of its own. If, however, physical educational emphasis occur. Under such conditions physical education is ber of legitimate objectives can be established *independent* of the goals of general education. Because such goals would be oriented to the preservation of the efficiency of movement (that is, the prevention of degenerative disease, the acquisition of desirable body image, the development of certain kinesthetic appreciations, and so on), they would generally be in harmony with the aims of general education. In many cases the realization of the goals of physical education (particularly those related to physical and mental health) would be prerequisite to the pursuit of many of the socially and/or politically determined goals of general education.

Up until the present, however, it is evident that physical education has been viewed pretty much as a tool of general education in the achievement of broad, cultural goals. As a result there have been a great many changes in the emphasis of physical education both in this country and abroad.

## Opportunities in Physical Education

Physical education is an extremely broad profession frequently merging into health education programs or recreation programs. Because the programs he is equipped to direct and the objectives he is dedicated to pursuing are utilized by different organizations in a variety of settings, the competent, *well prepared* physical educator will discover that he has a choice of many professional opportunities.

The various divisions of the school structure offer a great many opportunities to the prospective professional. Physical education teachers are needed at elementary, junior high, senior high, junior college, and college levels. Elementary specialists are in increasing demand, including both men and women. Some of the most challenging and exciting work in physical education is now being conducted at the elementary school level.

The junior and senior high schools continue to provide the bulk of positions. With burgeoning populations and new construction everywhere, positions are more numerous than ever before. It should be carefully noted, however, that in some areas of the country there are more male physical educators graduated than there are positions, particularly at the secondary level. Keep in mind, however, that there is always a demand for the *good, well prepared* physical educator. This concept, involving a clearcut distinction between positions in coaching and physical education, will be amplified later. Of course positions for women at the secondary level are always available, many of them remaining unfilled for lack of applicants.

At the college level there are several kinds of professional opportunity. One of these involves teachers of skills and games. Traditional college programs usually provide opportunities for students to enroll in classes in which they can improve or maintain physical fitness levels and learn skills that will be useful to them in their post-college years. Most colleges require at least a master's degree of all teachers, and many require higher degrees.

In recent years there has been considerable interest in revising college required physical education programs to place more emphasis on the *understanding* of how physical activity, sport, and play contribute to the health and well-being of the individual. Such programs are designed to add a dimension to traditional skill and fitness-oriented programs and should not be interpreted as a substitution of intellectual activity for physical activity. Teachers in this kind of program require greater depth of training than is usually available in the master's degree curriculum. Most schools employ team teaching techniques in conducting the various aspects of such programs.

living and well-being and to concentrate on the most valuable of these. This would mean that even though society may value very highly the ability of its citizens to get along with one another peaceably, physical education would not make these its major aims because many other aspects of the school program (drama, music, school government, and classroom and committee assignments) contribute to the social objectives. It would, of course, cooperate in making efforts wherever it could to reinforce desirable behavior in this regard.

Illustrations of the things that might be seen as being unique to physical education would be concerns such as physical fitness, sports skills, exercise techniques, and intellectual awareness of the physiological and psychological effects of exercise and sports participation. It should be noted that these are only examples and should not be interpreted as being an exhaustive list of the unique concerns of physical education. The only criterion required for determining whether a given objective should be placed on the list would be that of unique and ultimate responsibility. That is, if a given individual appears to have failed in the attainment of certain objectives, *to whom can he be referred for remedial action?* If, for example, a student seems continually depressed and uncommunicative despite all efforts of the instructor, he should be referred to the school psychologist. On the other hand, where does the instructor send the youngster who is chronically low on the physical fitness scale? The fact is that there is no one (including physicians, physiologists, and therapists) who have the training and background in this area that the physical educator is expected to have. Therefore, physical fitness is classified as one of the unique objectives. The only question remaining is whether it is a sufficiently important objective to be given priority. This decision must be made on the basis of philosophical considerations.

From the preceding discussion it should be clear that if one views physical education primarily as a tool to be used in achieving overall educational goals, then its primary objectives will change whenever changes in society's educational emphasis occur. Under such conditions physical education is a process or procedure, not a discipline, and cannot logically have any objectives of its own. If, however, physical educational emphasis occur. Under such conditions physical education is ber of legitimate objectives can be established *independent* of the goals of general education. Because such goals would be oriented to the preservation of the efficiency of movement (that is, the prevention of degenerative disease, the acquisition of desirable body image, the development of certain kinesthetic appreciations, and so on), they would generally be in harmony with the aims of general education. In many cases the realization of the goals of physical education (particularly those related to physical and mental health) would be prerequisite to the pursuit of many of the socially and/or politically determined goals of general education.

Of course the training of future teachers of physical education requires large numbers of competent professors. Such positions almost always require a doctoral degree as well as teaching experience at other levels. In addition to professional teaching opportunities, many universities now have research specialists who have only limited teaching responsibilities and spend most of their time in research endeavors.

Other positions for which graduate work is required include administrative or supervisory positions at all levels of physical education. While coaching responsibilities are not generally regarded as requiring advanced graduate study, many colleges do not hire people for coaching responsibilities alone, and in such cases advanced degrees are mandatory.

Opportunities existing outside the schools cannot all be listed. Some of those most commonly pursued by physical educators are found in organizations such as the YMCA, YWCA, YMHA, community centers, and municipal or private clubs. Boys' clubs, hospitals, churches, industrial concerns and other agencies also frequently employ physical education specialists.

It is becoming clear that this is an age of specialization. While a broad background is always necessary for effective professional accomplishment, today's problems require an expertise that cannot be attained without specialized study. This means not only better undergraduate theoretical and technical preparation but also advanced study. Specialists are commonly employed for positions in dance, acquatics, elementary physical education and gymnastics in the public schools. At the college level specialization is even more narrow. The person who plans to make the most of his potential must strive to secure the best possible undergraduate preparation upon which to select and build a future specialty.

## OBJECTIVES OF HEALTH EDUCATION

In terms of the establishment of general objectives, health educators have (at least in recent years) achieved greater unanimity than have physical educators. Since "health" has been defined in rather specific terms, it has been relatively simple to devise objectives for the educator to pursue.

It must be emphasized, however, that the field of health education is so broad (encompassing everything from sex education to the problem of metabolic disturbance resulting from rapid time zone change in east-west air travel) that it is essential that priorities be established on the basis of importance. Since there is always basis for disagreement on relative importance of specific objectives, there is still considerable disparity among health education programs throughout the country.

Many problems have been encountered in dealing with controversial topics such as sex education, birth control, drug abuse, alcoholism, fluoridation, and smoking. It is virtually impossible to separate social issues and value judgments from such issues, yet health educators are frequently forbidden to utilize any methods other than an objective approach (if indeed,

profession comes immediately to mind, but many of the other possibilities for service in this important area are not so apparent to the student beginning his college studies. Medical sociology, physical therapy, sanitation engineering, public health nursing, hospital administration, medical technology, biostatistics, and dental hygiene are just a few examples of many health-related career opportunities. These, of course, require preparation of varying kinds and amounts not usually a part of the programs in university departments of health, physical education, and recreation. The careers for which you can prepare in such departments are more likely to directly involve education. There is a need for more well prepared health educators, public and school. The school health educator is concerned primarily with planning and conducting educational programs within the public school organization, though he certainly can promote public health education as well. Most persons trained in health education have naturally gravitated in the direction of public school teaching positions. But public health departments and agencies are more and more becoming interested in utilizing the full-time services of public health educators. They also recognize the need for more in-depth preparation of such persons, especially with regard to the scientific bases of health.

The health educator with a baccalaureate degree may also continue his professional preparation by studying for a master's degree. Those with the interest, background, and intellectual capacity can achieve a doctorate, specializing either in health-related research or in health education or both. Such professionals most often choose to affiliate themselves with colleges or universities, but there are other agencies and institutions in need of these professionals as well.

The need is apparent and the opportunities for service in the health-related professions are both great and varied.

## OBJECTIVES OF RECREATION

Like the objectives of physical education and health education, the objectives of recreation have undergone change over the years. The goals sought by each teacher will, of course, vary depending upon the people and problems with which he works.

The Commission on Goals for American Recreation has produced a statement encompassing six objectives (119).

1. Personal fulfillment. In emphasizing the importance of the individual in our society, recreation is viewed as having one outstanding purpose: to enrich the lives of people. "One approaches personal fulfillment as he narrows the gap between his potentialities and his accomplishments." The recreation leader's challenge is to provide experiences "through which the individual may enjoy success in his search for adequacy or self-esteem."
2. Democratic human relations. Since exclusive concentration on personal goals may lead to the development of

selfish, noncooperative individuals, other goals relating to ethical behavior and social responsibility are important. Leaders are urged to be alert for opportunities to cultivate "respect for human beings and concern for their welfare."

3. Leisure skills and interests. People engage in activities that they perform well. Development of a high degree of skill is regarded as the best means of insuring interest and participation in a given activity. Enlarging the scope of people's interests is regarded as contributing to a more rewarding life.

4. Health and fitness. Vigorous muscular exercise is regarded as an essential factor in the maintenance of the healthy, vigorous organism. Because contemporary society has so drastically reduced man's opportunities for vigorous activity, it is regarded as essential that recreation programs include and encourage involvement in vigorous physical activity.

5. Creative expression and esthetic appreciation. Emphasis on opportunities for personal expression and creative experiences is important as an antidote for some of the negative effects of an increasingly materialistic society. With increased leisure for all people creative participation in life is seen as assuming unprecedented importance.

6. Environment for living in a leisure society. Recreation seeks to counteract some of the effects of the destruction of our natural resources by providing facilities and experiences that will bring people into contact with nature. Participation in and enjoyment of music and drama as well as other artistic and esthetic endeavors is another goal which is sought by recreation leaders as they work to add meaning and enrichment to the lives of people.

It is apparent that to select any one objective as being more important than others is difficult because they are closely interrelated. There are certain aspects of each, however, that are of common interest to health and physical educators as well as recreation people. Because of these common objectives it is possible for training in certain professional subjects to benefit individuals preparing for each of these professions.

If the recreation person is to be interested in the fitness of those with whom he works, he must have a basic understanding of fitness, what it is, how it is maintained, and what its limitations are. The same is true for motor development and the teaching of motor skills.

Psychological principles are particularly important. Because there is no real coercive element in recreation programs, programs will be engaged in solely on the basis of their appeal or the appeal of the recreation personnel. An understanding of human behavior can spell the difference between success and failure.

Although the public does not really understand what a university recreation course consists of, the prospective recreational specialist should. Obviously, it is not necessary to have four years of college training in order to teach a class in crafts or square dance. Nor is such training necessary for success in leading sports programs and running tournaments. If recreation programs are

to achieve more than simply "keeping the kids off the street," however, preparation of leaders who understand the problems and know the principles involved in developing solutions requires *at least* four years of college level preparation.

## Opportunities in Recreation

Recreational opportunities, as one would expect, have expanded enormously in the past twenty years. Because so many kinds of programs are provided in communities, people with widely divergent interests may find employment in one of them.

Some of the institutions and agencies with organized recreation programs and recreation personnel are:

1. Federal, state, city, and local governmental divisions. This includes parks, schools, conservation departments, military establishments, forestry service, and welfare agencies. Federal grants are currently providing a number of extensive recreation programs.
2. Private agencies. Well-known agencies such as the YMCA, YWCA, YMHA, church-sponsored community centers, Boy Scouts, Girl Scouts, and Campfire Girls continue to require large numbers of qualified leaders. Other organizations such as private clubs, camps, and charitable organizations require leaders with training to operate camps and organize community projects.
3. Commercial agencies. Many commercial enterprises hire specialists in the organization and teaching of recreational activities. Summer resorts, bowling alleys, theaters, food specialty chains, and manufacturers of sporting goods are some of the kinds of agencies interested in recreation.
4. Industrial plants. Industrial plants have moved into the area of recreation with large programs. Frequently programs are sponsored throughout the year for the entire family of the employee. With the recognition of the fact that private industry must take a large share of responsibility for the provision of things that will assist less affluent members of our society to achieve their potential, more emphasis is likely to be placed on programs such as these.
5. School programs. It has long been evident that schools in city and suburban areas needed to become centers for more kinds of community activity. Taxpayers are beginning to insist that the vast funds expended in school construction return greater dividends in terms of more use. This means that recreation programs, not just for children but for all segments of the community, are being established in school facilities. Although school personnel may occasionally be involved in such endeavors, the programs themselves are frequently separate from the school operation, and personnel are not school teachers putting in extra hours. Such "lighted schoolhouse" programs can aid in solving the fundamental problems of providing the necessary funds to meet the needs of the community.

## Effectiveness of Recreation Programs

The evaluation of the effectiveness of recreation programs in terms of the established objectives is exceedingly

difficult. Because other factors also bear on those that the recreation professional is interested in, it is difficult to conclude just which factors produce what effects.

The new governmental programs mentioned previously, for example, utilize a great many techniques in attempting to get potentially capable youngsters prepared for college. Recreation is only one of these techniques. It is difficult to evaluate reports claiming success in teaching Spanish or geometry in Head Start programs by the incorporation of recreation techniques. Another problem is that when we begin talking about the use of recreational techniques in teaching or in obtaining some desired behavior, are we still talking about recreation? Some people feel that we are not.

It is easier to assess the effects of leadership on the kinds of programs produced and the number who participate. These kinds of research have considerable usefulness in establishing the need for capable recreation leaders. For example, a report by Chandler and Hyde (98) indicated that in an institution for elderly people, the social interaction and participation of socializing activities were dependent upon the presence of a recreation leader. His absence resulted in a 50 percent reduction in socializing behavior.

Other studies relating to health, physical fitness, social, and psychological characteristics have been reported in other sections of this book. Many of these could be regarded as being pertinent to recreation because of the kinds of activities involved.

There remains a great deal to be learned about the overall effects that recreation programs can have on our complex, confusing culture. Can the depersonalizing effects of the computer age be forstalled? Can concern and compassion be a part of a mechanized, sophisticated (sometimes cynical) society? These are only examples of the important questions that need answers.

*Play is more than a pastime, it is a fundamental tool for the discovery and rediscovery of the meaning of living. An understanding of the relationship between play and the development and fulfillment of the self is a prerequisite for effective programing. The creation of recreation theory rests upon this cornerstone (506, p. 50).*

## SUMMARY

Definitions of physical education vary significantly and are usually phrased in terms of what physical educators *do* rather than what they study. Part of the difficulty in coming to substantial agreement on primary objectives for physical education may stem from lack of agreement about what physical education really is. It has been suggested that the study of human physical activity, with all its implications, should define the limits of physical education.

Health education has had few problems of definition, but "health" as a concept has undergone considerable expansion in recent years. While separate classes in health education are found in most of the larger schools, full-time health educators are still the exception rather than the rule.

Recreation, as a career, defies precise definition, much as physical education does. Its operation is closely associated with man's leisure but is certainly not synonymous with it. The concepts of work, play, and recreation are complexly intertwined making the tasks of recreation leaders exceedingly important, as well as difficult.

Although it is not currently possible to get physical educators to agree on the *primary* objectives of physical education, the major objectives most often articulated can be placed into general categories such as: (1) organic development, (2) social development, (3) psychological development, (4) development of cognition, (5) philosophical development. The objectives most commonly stressed have fluctuated with social conditions and shifts in educational philosophy. It is suggested that the objectives most commonly pursued with greatest vigor are not necessarily the objectives of greatest importance to the welfare of the student.

Criteria for the establishment of objectives are based on philosophical considerations. The wide variety of objectives is understandable in the light of differences in philosophy within the profession. One way to simplify the problem of selection of primary objectives would be to make selections on the basis of the *uniqueness* of contributions of physical education to individuals. One problem is that this procedure ignores the establishment of priorities in terms of the relative *importance* of all possible objectives. That is, if uniqueness *alone* were used as a criterion, the matter of whether a given objective has any relevance to the needs of individuals would not even be considered. Selection of only the unique, *important* objectives again involves philosophical considerations and may narrow the scope of professional concern excessively.

The broad, basic objectives of health education have been well articulated and are widely accepted. Other problems have been encountered, however, in the matter of controversial subject matter (such as drugs, sex education, and smoking) and in the matters of exactly which techniques should be used in the pursuit of desired objectives.

Objectives of professional recreation leaders have changed considerably in recent years as social problems have multiplied. Although *primary* objectives of recreation may differ substantially from those of health education or physical education, the tools and activities used in their achievment are nearly identical with those used in the other professions. Opportunities for employment in each of the three fields are greater today than ever before. The serious nature of the problems now being faced has, however, made the quality of professional preparation an extremely important factor in securing desirable positions.

## PRINCIPLES

1. If man is viewed as an entity (as opposed to the old dualistic concept of a mind and a body), the term "physical education" becomes entirely unwieldy as a name for a discipline.

2. The boundaries of a discipline cannot be adequately defined in terms of what its professional members do. Generally, it must be described in terms of "the study of . . ." rather than "the teaching of. . . ."

3. If an overall discipline can be defined as the study of human physical activity, physical education (the teaching of concepts, skills, and techniques), would logically become the educational arm of the discipline.

4. Health, as a concept, is more than mere absence of disease; it is a state of complete physical, mental, and social well-being.

5. Political and economic conditions have resulted in the possibility of mass leisure that looms simultaneously as a potential threat and a potential blessing.

6. The fact that a given professional objective has widespread approval and practical support does *not* necessarily mean that it is more important than other less popular objectives.

7. Two distinct approaches to the problem of determining objectives to be given priority can be identified. One is to determine the needs of the student and shape objectives to fit these needs; the other is to identify the potential *unique* contributions of the discipline and structure objectives around them.

## EXPERIMENTS AND EXPERIENCES

1. Create a check sheet listing as many "possible objectives" of physical education as the class can formulate. Each class member should then rank these objectives in the order that he *believes* most accurately reflects the objectives of high school physical education programs.

2. Survey the class and determine the percentage of students who have experienced formal, classroom instruction in health (apart from that incorporated into science courses).

3. Contact all available community recreation agencies and determine the number of events sponsored that have as their objective the improved health of their members.

4. Obtain a list of facilities available for recreation in your city. Estimate the maximum number of people that could be accommodated at any one time. What implications does this have for future programs of recreation?

## SUGGESTED READINGS

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# Development and Current Status of the Professions

# Chapter 3

## STATUS OF PHYSICAL EDUCATION

In looking at the picture in the public schools today, it is easy to identify the major patterns followed by physical educators. Sports skills and physical fitness are obviously the two factors most commonly stressed. Furthermore, in many instances the fitness objective is applied to the great mass of students while the skills objective is vigorously pursued with only a relatively few talented performers, who are usually members of interscholastic teams. Although it is true that the skills of team and individual sports are used as the basis of the curriculum in most schools today, inadequate facilities, large classes, and other factors have resulted in programs providing very little individual evaluation and instruction for most students. On the other hand, great attention has been given to this type of instruction at the varsity level.

In very blunt terms this means that in too many schools physical education classes consist of large groups of students being turned loose in small gymnasiums to play some form of team game. Instruction is usually minimal or entirely absent.

Evaluation of student needs and progress is usually a matter of guesswork rather than objective measurement. On the other hand, varsity sports are given a great deal of attention, time, and money. The coach-player ratio is very low, and several assistants are usually available to aid the head coach.

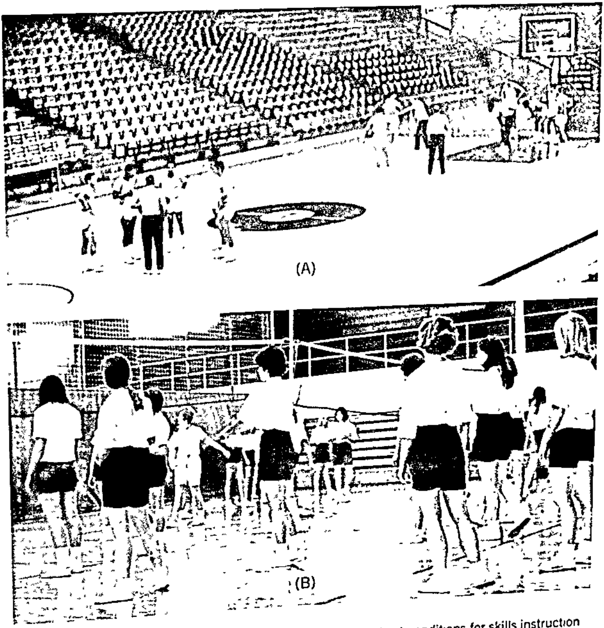



**FIGURE 3.1** Even in the finest American school systems, the best conditions for skills instruction (as illustrated by student teacher ratio and adequacy of facilities) are provided for those who have the greatest ability. Pictured are: (A) varsity basketball players and coaches and (B) girls' physical education class and teacher.

## DEVELOPMENT OF PHYSICAL EDUCATION

As has already been pointed out, several factors in our recent history have combined to shape our present philosophies and practices in physical education, as well as health education and recreation. If you are typical of the student who is just entering one of these professions, you are more interested in considering the future than the past. For that reason a detailed discussion of the history of physical education will not be presented. But because it is helpful in many ways to understand some of the events that have led up to our present circumstances, a brief backward glance will be taken here.

Physical education as a part of the public school curriculum may well owe its existence to war. The physical survival of individuals, as well as societies, has historically depended upon the ability of men to defeat other men in physical combat. It is not surprising to find, in looking back over the years, that nations have always demanded increased fitness for their citizens whenever wars have threatened.

### PREHISTORY

If one is willing to interpret *physical education* in a very liberal way, it is possible to say that the instructions given by cave-dwelling fathers to their sons in techniques of stalking and killing game (as well as human enemies) constituted a kind of physical education. Indeed, survival depended upon swiftness of foot and strength of arm; survival of the fittest was the most fundamental of laws. Under such circumstances of daily crisis (or "war") there is no doubt that physical fitness was a state to be highly valued. Observations of this kind have only limited value, of course, because no one would suggest that there existed any kind of formalized program of education during this period.

The earliest known records of systemized instruction in exercise for purposes other than combat are those from early Egypt and surrounding regions. It is apparent that, for certain classes of people at least, skill was developed in activities such as swimming, wrestling, dancing, and gymnastics as early as 2000 B.C. Instruction in activities more directly related to combat, such as archery, riding, and boxing, was also common.

### EARLY CIVILIZATION

Although it is generally agreed that civilization developed earliest in the southern Mediterranean countries, it is also apparent that the Chinese produced a remarkable early culture. As the mystical religions of the east developed, less and less emphasis was placed on the care of the body. Because war was viewed more as a necessary evil than as a worthy pursuit of life, educational systems for the training of soldiers did not become as highly developed as in other countries. Ancient China did, however, produce a system of light exercises designed to prevent disease. This form of medical

gymnastics called *Cong Fu* combined stretching and breathing exercises and was usually performed in a sitting or kneeling position.

Examination of historical accounts of other ancient civilizations indicates that most activities that could conceivably be labeled "physical education" were generally connected either with religious rites (as with the dance) or with preparation for combat. From a recreational standpoint there have been games and pursuits such as hunting, fishing, and other activities practiced since antiquity. Some of the most ancient artifacts are toys that were used by children in their play. Ancient references to ball games of one kind or another can be found in both written accounts and art of the various periods.

## EARLY JEWISH INFLUENCE

One of the ancient cultures having most influence in the development of Western civilization was that of the Hebrew people. Whereas the great emphasis on education generally excluded anything that could really be called physical education, it is of great interest to note the fact that the religious laws provided for health practices that were far advanced over other civilizations of the time. Cleanliness in the preparation of foods, the cleansing of eating utensils, and the washing of wounds under running water anticipated many modern disease-prevention practices.

Although the ancient Hebrew people apparently had great respect for human strength and although they certainly recognized the need for training for warfare, their culture made little provision for sport or games. Whereas the influence of conquerors had, from time to time, caused Jewish communities to build stadiums or other sporting facilities, such influences were usually rejected when the domination of the conquerors ended. So, although we have derived many of our precepts about education and the responsibility of parents for the education of their children from the Hebrew tradition, little else that directly applies to physical education or modern recreational practices can be attributed to the ancient Jewish influence.

## THE GOLDEN AGE

On the other hand, one of the cultures having the greatest influence on modern practices in our profession was that of the early Greek civilization. One of the most obvious signs of this influence is that of the Olympic Games; this sporting festival originated in Greece about 776 B.C. as one of several such festivals held periodically. They achieved such importance that wars among various city-states came to a halt temporarily in order that the Olympics might be held every fourth year.

The idea of periodic international athletic competition is only one of many concepts that have been borrowed from the remarkable culture of the early Greeks. This period has been called the Golden Age because of the almost unbelievable contributions it made to the culture of man. Art, science, music, drama, philosophy, education,

commerce, agriculture, and practically every other endeavor of man received a tremendous acceleration during this period. In short, this was the birth of Western civilization.

Most of the information we have about the ancient Greeks has come to us through such accounts of life as were recorded by Homer in the *Iliad* and the *Odyssey*. Through the accounts of such heroes as Achilles and Odysseus we learn not only of the ideals valued by society but also of the educational aims and goals. The detailed accounts of the funeral games and the religious ceremonies give us a picture of a vigorous people who, even though they were in a position to make choices, apparently had no desire to lead a life of ease. We are also led to see the development of a society that placed the highest possible value on the harmonious development of all aspects of an individual's capabilities; action and wisdom were highly prized as characteristics to be equally developed. It is interesting to note that as the Greek culture evolved, it became taken for granted that every citizen had a responsibility to exercise daily in addition to other duties, including strenuous military training. The state provided gymnasiums for the use of all male citizens, and it was expected that even older men would make use of the facilities for their physical well-being. Of course, it must be remembered that cultural activities of other kinds also took place at the gymnasium, especially during the later period of that age.

It must not be assumed that aims and practices were uniform throughout ancient Greece or that these remained constant across the years. You will remember that Greece was composed of a group of city-states, each independent from the other. Athens and Sparta were two of the largest and most influential and are representative of differing attitudes toward the citizen's preparation to meet these responsibilities. Although a more detailed discussion of the philosophies involved will be found in Chapter 7, you will remember that, in general, Sparta stressed military preparedness and discipline whereas Athens was noted for its more democratic emphasis in securing the services of the individual for the state. There were other differences as well, but there were also some significant similarities.

One of the most interesting characteristics of the city-states was their belief in the involvement of citizens in the affairs of the state. This is exemplified not only in the training for fighting that was expected of every citizen but also in the fact that the citizens themselves were the participants in the games of the various festivals. Apparently nothing was more highly prized than to be the well-rounded man, a perfect balance between the man of action and the man of wisdom.

It has been said that one of the significant reasons for the great cultural accomplishments of this period was that unusual individual freedom of thought and action was coupled with individual responsibility for civic affairs. Similarly, it has been observed that this society passed its pinnacle when freedom led to individualism without a civic concern. When prestige

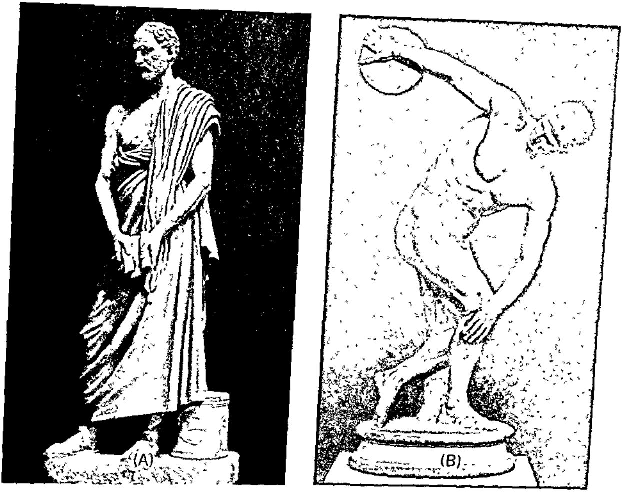



FIGURE 3.2 Ancient Greece was remarkable for its equal emphasis on the perfection of physical and mental attributes. (A) Demosthenes, antique sculpture (Vatican Musuem, Rome, Alinari–Art Reference Bureau), (B) Myron's Discobolus, Roman copy after bronze original (National Museum, Rome).

became more easily obtainable through wealth and political power than through individual cultural and physical accomplishments, the strength of the city-states began to crumble. The vulnerability of Greece was further increased by the shift in concept from idealizing the man of balanced action and wisdom to idealizing the man of wisdom only.

If the story of physical education in Greece were nothing more than another example of how a young, vigorous nation rose to a position of prominence and then, through neglect of physical vitality, fell prey to another more vigorous culture, there would be little that is unique to study. In this case, however, physical activity, athletic performance, and the maintenance of physical fitness were regarded, for the first time, as something more than mere preparation for war or individual combat. There was a period at the height of the Greek civilization when education was thought to be complete only when a

man could perform as well as think. For a young man to exhibit a flabby body was to admit a deficiency in his education (see Chapter 7).

Furthermore, the esthetics of performance were highly valued. The appearance of the body was ideally to suggest a fine balance and harmony of development. The classical Greek statuary indicates the esteem in which grace and harmony were held, as opposed to muscular bulk for its own sake. It is also true that during this period the quality or appearance of the performance was regarded as highly as was the final outcome in terms of winning and losing.

With the decline in participation in games by the citizenry and the concomitant increase in professionalism, less and less emphasis was placed upon the *experience* of performing; the *outcome*, as well as the entertainment provided by the spectacle, became the important factors.

## ROMAN INFLUENCE

After the Greek civilization fell to the Macedonians, and later to the Roman Empire, much of the unique character of the Greek attitude toward physical education was lost. The Roman had no taste for the Greek tendency to involve himself in the games and contests of the many festivals. The Roman preferred to observe the giant free spectacles from the comfort of the grandstand. Furthermore, the Roman had become accustomed to the emotionally charged spectacles of bloody gladiatorial combat and brutal contests between animals as well as between men and animals. The relatively tame contests involving the throwing of the javelin or the discus had little attraction for him. And whereas he found some entertainment in observing the time honored wrestling and boxing contests of the Greeks, he found it necessary to brutalize even these. The wearing of nailed gloves and riveted fist wrappings became so popular that blows produced gory wounds and hideous permanent injury, if not death. It is little wonder that after years of observing "athletic" contests of this nature, founders of the early Christian church turned away from any consideration of physical activity or exercise as a worthwhile pursuit. The fact that many of the early Christians were slaves who might themselves be subjected to deadly mock wars or animal combat in the arena for the pleasure of the masses might well have encouraged them to emphasize the spiritual, otherworldly aspects of their religion.

Whatever the reasons, it is a fact that as the influence of Christianity grew, the legitimacy of sport and physical training declined. The glorification of the body came to be regarded as a sinful tendency to be resisted at all costs. It was during this period that the body and spirit were pictured as two separate entities constantly warring against each other. In order to elevate the spirit, and thereby come closer to God, people subjected themselves to all kinds of physical discomforts and tortures. Any suggestion during this period that man was a single organism and that the

of knowledge, to comprehend the period of nearly a thousand years of retrogression and stagnation as far as learning was concerned. Only a worldwide nuclear holocaust could approximate today the conditions prevailing at the depths of the terror-ridden Dark Ages. Under such circumstances survival is the only objective of any personal importance; cultural considerations are nonexistent.

## THE RENAISSANCE

About the tenth century, however, there were stirrings of interest in matters beyond the local level. The causes and implications of this beginning of the period known as the Renaissance cannot be discussed here, except to indicate that religion and the Church played an important part in this revival of culture. The simple fact that representatives of European areas began to venture once again into unknown lands created the conditions for exchange of knowledge, an aroused curiosity concerning other peoples, and a basis for at least a limited commerce among peoples. The crusades into the holy lands, as destructive and as poorly conceived as they often were, did contribute substantially to the rekindling of interest in learning and culture.

It was during this time that knighthood provided the only arena in which any physical education was practiced. The familiar stories of jousting and tournaments provide descriptions of the kinds of activities that young men of noble birth, at least, might hope to pursue. But it is clear that these activities were really no different than those practiced over a thousand years earlier. One significant difference, however, was the creed of chivalry that served over the years as a prominent factor in raising barbarianism to the level of civilization.

Despite the fact that the new enlightenment brought the development of universities and the congregation of young men who frequently engaged in games and sports of one kind or another, there was no official sanction or encouragement of such amusements. Gradually some of the private schools of southern Europe began to include some provision for exercise and recreation. In most others, however, such activities were either ignored or frowned upon by educators of the day.

This is not to say that there was not considerable interest in sporting activities during the Renaissance. Fencing masters were in great demand among the wealthier segments of society. Bowling on the green, tennis, and dancing, as well as other spectator amusements, were very popular. In an era when courtliness and good manners were stressed, many of these activities were considered indispensable means of promoting proper carriage and grace. All this was in addition to the time-honored practices of riding, wrestling, swimming, shooting, and other combat-related activities.

As the renewed interest in learning progressed, it was accompanied by a great social and political upheaval. Dis-

satisfaction with punitive economic practices spelled the collapse of feudalism, just as revolt against religious despotism resulted in far-reaching political and religious reforms. And although the Protestant reformation led to the creation of many denominations and sects, it did not produce greater religious tolerance. Conflict and persecution were responsible in a large measure for the establishment of colonies in the lands newly discovered by those who were seeking new trade routes. The hard work and privation required for survival in frontier settlements combined with religious doctrines (that tended to brand as sinful any form of recreation) to effectively prevent acceptance of physical education as a part of the school curriculum in the New World, as well as throughout much of the Old World. Social events were generally built around one of two legitimate activities: worship or work. Any activities that might be termed recreational needed to have some productive purpose such as that provided by quilting bees, house raising, or harvest contests. Even the natural playfulness of children was considered frivolous activity that must be curbed as early as possible.

## THE ENLIGHTENMENT

In the seventeenth century it was the rule rather than the exception to regard children as being little adults. In this kind of atmosphere it is not surprising that little thought was given to needs for physical education in the school programs of the day. There were those, however, who were strongly opposed to this philosophy. One of the best known of the so-called naturalists, who led the philosophical revolt against the practices in the eighteenth century, was Jean Jacques Rousseau. This noted French philosopher meticulously outlined an educational program that gave great emphasis to the development of physical stamina, strength, and coordination. The concept that it was a *human being* that was to be educated rather than a *mind* (as distinct from a body) was in direct opposition to the then current beliefs and practices.

Although Rousseau's ideas were tried in only a few private schools of his day, the ideas did not die. As cultural climates became more amenable to ideas of individualism, his concepts and others of similar direction came to be included in the design of curricula in various countries.

However, it was only through a long, complex series of social changes, including wars, political upheavals, philosophical and scientific advancement that physical education became an integral part of any educational system. As always, preparation for war continued to be one of the strong motivating forces for the inclusion of physical education in the school programs. This factor alone, however, seldom seemed sufficient for the justification of its inclusion. In most nations the increased awareness of the necessity for adequate exercise in the optimum development of children was an important consideration.

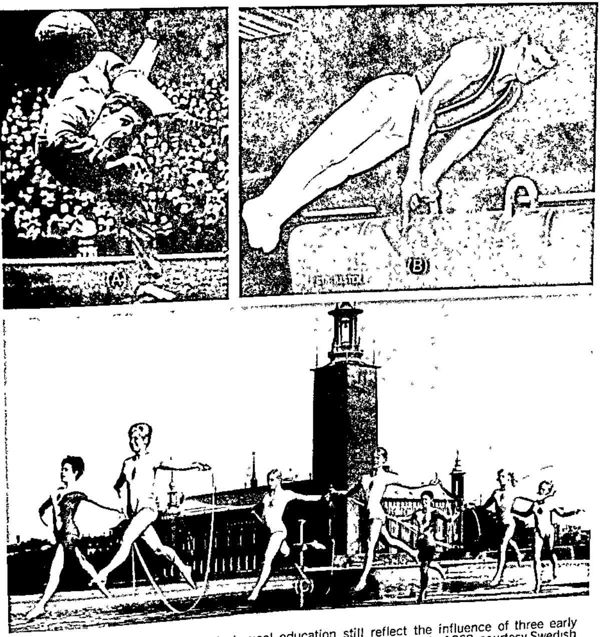
## EUROPEAN SYSTEMS

Germany and Sweden are the two countries that come to mind most readily whenever early programs of physical education in the schools are discussed. Out of Germany evolved gymnastics oriented to the use of so-called heavy apparatus such as parallel bars and vaulting horses. Friedrich Ludwig Jahn and, later, Adolph Speiss were responsible for development of much of the German System. Swedish gymnastics, largely attributed to Per Henrik Ling, were performed in conjunction with balance beams, stall bars, and other equipment of a "lighter" nature. Elaborate progressions and stipulations of proper form for the performance of exercises in both systems were painstakingly developed by their respective proponents.

At about this same period of the nineteenth century, the "public" schools of England were developing their own approach to physical education. These schools (which, despite their name, were maintained for the benefit of the aristocratic families only) stressed classical studies of language and literature as well as some science. In addition to these studies, the boys participated in a growing number of individual and team sports and games. Tennis, swimming, boxing, soccer, cricket, boating, and other activities became extremely popular at these institutions. Administrators of these schools encouraged this kind of participation not only for the physical fitness values they provided but also for the qualities of leadership, perseverence, and sportsmanship that they were believed to promote. It is noteworthy that despite efforts to popularize the formal European gymnastics programs in England, the populace never accepted them with the enthusiasm that they retained for their sports and games.

Today, as we look around the globe at the various systems of physical education as they are currently practiced, we can see clearly the influence of the three systems just discussed. The intensely competitive colonization not only expanded empires but also carried cultural influences, such as these favored systems of physical education, to many parts of the world.

Of course, the cultures into which systems were introduced determined whether they would be successful in meeting the needs and desires of the people of the culture involved. In America, for example, both the Swedish and German systems were introduced into the school systems at approximately the same time; both enjoyed some success. It is apparent today, however, that the predominant influence in American schools is that derived from the British society. It is clear that the nature of a people combines with prevailing economic and political conditions to produce educational practices. The United States has adopted a blend of the European systems to which it has added its own unique modifications. This is not to say that there is any such thing as a *national* curriculum in physical education. Surely many regional and local variations persist, both in regard to type of activity and quality of program. Generally speaking,




Courtesy Adidas

**FIGURE 3.3** Modern programs of physical education still reflect the influence of three early systems: (A) English, (B) German, and (C) Swedish, picturing the Sofia Girls, 1968, courtesy Swedish Information Service.

however, programs of physical education in this country are built around the sports-and-games concept. Criticisms regarding the alleged inadequacy of such programs for the building of adequate fitness levels have been met by the addition of more formal types of activity to existing programs, in most cases, rather than a change in emphasis and replacement by activities designed strictly for the development of physical fitness.

## TODAY'S PHYSICAL EDUCATION

If we discount the remarkable culture of the early Greeks, we can see that physical education is really a very recent development in man's history. When we stop to consider that the earliest systems of physical education were introduced into the schools only about 150 years ago (and less than 100 years ago in the United States), it is apparent that we are dealing with a very young aspect of education. When we then look at the changes that have occurred in the world within the last 100 years as compared with all that have gone before, it is not surprising that there are differences of opinion about what the main purpose of physical education should be in America and the world.

### THE FUTURE

There is little doubt that the next ten years will be critical ones for physical education in the United States. We will be facing problems that man has never before encountered. The role that physical education is to play in the lives of people will be determined by a great many factors, including social preferences, educational aims, economic goals and conditions, and political pressures. If our profession is to survive and emerge as a truly positive contributor to the welfare of mankind, physical educators themselves must become aware of:

1. The ways in which physical activity affects man and his environment
2. The ways in which man and his environment limit, encourage, and generally affect human physical activity

## CURRENT STATUS OF HEALTH EDUCATION

When we address ourselves to the question, "Where is health education today?" we naturally turn our thoughts to the questions: "Where were we?" and "How long has it been since we were there?" Investigation leads to two somewhat striking answers to the latter questions: "It was awfully dark and bleak where we were and it has been less than a hundred years since we were there." To put it another way, health education is "young," and it has grown and developed tremendously since its earliest beginnings about 1870, when it was nothing more than a temperance and antivice program with some anatomy, physiology, and hygiene thrown in for good measure.

### EARLY PRACTICES

Ancient societies, including the Chinese, Egyptians, Hebrews, Greeks, and Romans, including a period from about 3000 B.C. to A.D. 1700, were concerned to some extent about physical well-being and stressed certain rules for hygienic living. Emphasis was placed most commonly upon "physical" health and well-being and the absence of disease. Horace Mann, in 1840, stressed the importance of physical well-being and "educating for health," (188, p. 14)

but was largely ignored. The public health movement in the United States began in 1850. At that time city governments began to establish and upgrade health departments as a direct result of Lemuel Shattuck's *Report of the Sanitary Commission of Massachusetts* (188, 223). In this report, Shattuck described a modern program of public health—especially preventive programs—and gave impetus to the idea that health was more than absence of disease. Perhaps of even greater importance were his suggestions for *health education.*

Ohio instituted a state program in 1872; it was typical of those instituted from that time until about 1918 in that it was "anti-vice and function-of-the-body" oriented as a result of the powerful temperance-sponsored propaganda movement. Health as it is now conceived was not emphasized until sometime after World War II.

We can approximate the progress of health education from the early 1930s to the present by perusal of several typical health texts for college students. Williams' (609) fourth edition of *Personal Hygiene Applied*, for example, was published in 1931 and included several chapters on the meaning of health, the health problem, man in society, the approach to health knowledge, and science and attitudes, all apparently directed at setting the mood for effective learning. The remainder of the text was devoted to "the hygiene of" each of the major systems of the body and to nutrition, the mouth, eye and ear, and "sexual aspects of life." One chapter was devoted to "prevention of specific diseases." Hygiene and the study of body function was still in vogue in 1931, but *eleven* small-size pages were devoted to some sex education!

By the mid 1950s there was less emphasis on the systems of the body per se. See, for example, Kilander's *Health for Modern Living* (310). Personality and mental health, dating, courtship and marriage, growth and development, nutrition and weight control, relaxation and recreation, study of stimulants and depressants, alcohol and tobacco, more extensive treatment of disease, planning medical protection, and national health resources were now typical of health education content.

## TODAY'S HEALTH EDUCATION

In the mid 1960s we apparently had returned to some emphasis on the function of the body's system per se and some effort at defining the importance of health education. In Miller and Burt's *Good Health* (390) we see that physical fitness was added and that there was more extensive treatment of sexuality and reproduction. Family planning appeared, and strong emphasis on problems related to tobacco, alcohol, and narcotics was continued. Consumer health appeared on the scene, as did greater emphasis on *community* health and personal appearance. Some coverage of emergency first-aid procedures and a discussion of radiation dangers were also included.

Another development has been health education's recent trend in the

direction of the conceptual or "big ideas" approach to learning. Perhaps it is too early to call this a trend, but considerable time and money was spent on the development of a conceptual model for school health education, and it appears most likely that the approach will be more and more utilized. The approach is based on the precept that the "big ideas" or basic concepts are better retained and assimilated than are facts. There are three key concepts: growing and developing, decision making, and interactions. The new terminology may be somewhat misleading, but when we turn to the ten concepts subsumed by the three key concepts, the picture becomes clearer. These ten concepts are listed in Table 3.1. Categorized under each of the ten concepts there are from two to four substantive elements, a total of thirty-one of these in all. The curriculum then is organized around these substantive elements in terms of goals for the learner and behavioral outcomes at a particular developmental or grade level.

There is yet another bit of evidence that leads one to believe some health educators have awakened. The *ideal* approach is no longer viewed as the textbook and lecture method; there are problem solving and experiments (as well as the older movie-film, posters, pictures and television methods). Although the idealistic new programs are not yet widely being used, the fact that they are being utilized at all is encouraging.

## THE FUTURE

As a final note and fitting close to the discussion of the question, "Where is health education?", let us say "not where it *has* been (fortunately!) but not yet where it can be." To be sure, there are encouraging signs as we have pointed out. But every school does not yet teach health as it should be taught (too many still do not teach it at all); and the

**TABLE 3.1 Ten Concepts for Health Education**

| |
|---|
| Growth and development influences and is influenced by the structure and functioning of the individual. |
| Growing and developing follows a predictable sequence, yet is unique for each individual. |
| Protection and promotion of health is an individual, community, and international responsibility. |
| The potential for hazards and accidents exists, whatever the environment. |
| There are reciprocal relationships involving man, disease, and environment. |
| The family serves to perpetuate man and to fulfill certain health needs. |
| Personal health practices are affected by a complexity of forces, often conflicting. |
| Utilization of health information, products, and services is guided by values and perceptions |
| Uses of substances that modify mood and behavior arise from a variety of motivations |
| Food selection and eating patterns are determined by physical, social, mental, economic, and cultural factors. |

SOURCE Health Education A Conceptual Approach to Curriculum Design. Washington, D.C., School Health Study, 1967, p. 20

conceptual model is still just that—a *model*; the test is yet to come—can and *will* these dynamic new ideas in health education be utilized effectively?

## THE DEVELOPMENT OF RECREATION

### EARLY BEGINNINGS

The concern over the problem of learning to deal with leisure has sprung from several sources. Americans tend to believe that the phenomenon of free time is unique to the modern, industrialized societies. You may recall that the ancient Greeks (and the Egyptians before them) had a great many festival days during the year and that the Romans are reputed to have had nearly as many holidays as workdays. It is generally conceded that the failure to wisely utilize this time was a contributing factor to the downfall of the Roman empire.

Of course, festivals and religious holidays are only one means of assessing the degree of recreation engaged in by ancient societies. There is no doubt that man has always been compelled to play. "Abolish religion and recreation from the face of the earth and within two moons they would return again" (72, p. 106). Both of these activities involving man's attempts at self-fulfillment and search for meaning have played significant roles in the development of civilization. Recreation is a means of dealing with boredom, and it is clear that much of the leisure of man has been spent in imaginative ways of meeting challenges presented to him by his culture.

Although recreational pursuits must have persisted among common people during the Dark Ages, the available records concerning such activity deal only with royalty and Church figures. The Renaissance produced another kind of activity to be utilized during leisure, that of learning. It was during and after the Reformation, however, that the roots of the "evils of idleness" idea took hold.

The period of colonialization carried cultures of established societies throughout the world. Religious differences provided the impetus for many of the early settlers to leave Europe, and some of the persecuted groups colonizing the inhospitable new lands developed attitudes that have had profound effects on succeeding generations.

### ATTITUDES TOWARD PLAY

One of the most enduring of these attitudes was that developed concerning work. Any unproductive activity was deemed sinful. Because play and other recreational activities were obviously unproductive, they were equated with the sins of idleness and sloth and were firmly discouraged. Many of the recreational activities of that time were "disguised" by the addition of a work element. Husking bees, barn raisings, and similar events became events to look forward to with great anticipation. Even though the harsh environmental conditions were gradually controlled, the Puritan "work ethic" persisted,

and its influence spread throughout the early United States.

It is of considerable interest to note the relationship between recreation and the Church during this time. Although "play" was not permitted (or was frowned upon, at least) the religious activities became extremely popular. Lonely settlers came great distances to attend evangelistic meetings in tents or cleared areas. Accounts of these services give an indication of the extent to which religion, in a sense, became a substitute for recreation (161, p. 80).

It was not until the Industrial Revolution, however, that the American citizen (as well as the European) began to learn what leisure meant. Less time was required to meet the requirements of life, and more money became available for recreational use. The expansion of business opportunities, however, became almost a "game" in itself. Because work had always been a legitimate outlet for one's energies, the excitement of commercial competition, getting and spending, attracted the attention of many.

The money produced by this rush of business activity, associated with the growth of cities around industrial complexes, made possible the development of "spectating." Horse racing, professional foot racing, boat racing, and other types of competition attracted large throngs of spectators, frequently taxing the capacities of transportation and housing facilities. "Phineas T. Barnum of circus fame stands out as the leading figure of this period in amusing the populace. No struggle between dramatic standards and popular taste ever troubled the master showman of them all. He was not one whit interested in art; he was interested in entertainment" (161, p. 122). Barnum's ability to provide a vast variety of entertainment for the people of the 1850s may have had a significant effect on their readiness to pay for the opportunity of viewing athletic teams compete.

The first recorded football game between colleges was played in 1869 between Princeton and Rutgers. Three games were played, and there were twenty-five players on each side. It took a few years for the game to catch on (it was banned because of increasing roughness), but after some rules changes and after further exposure, the groundwork was laid for the establishment of rivalries that have since attracted millions of spectators.

The growth of sports not only provided people a chance to observe and to be entertained but also gave them new outlets for involvement and participation. In addition to these, activities such as bicycling and then "joy riding" in automobiles provided opportunities for fun and excitement that are still enjoyed today.

## MODERN LEISURE

The changes of the first half of the twentieth century are of little interest to the youngster who has never known anything but television, supersonic aircraft, and computer technology. He will be interested, however, in the effect that the changes produced in

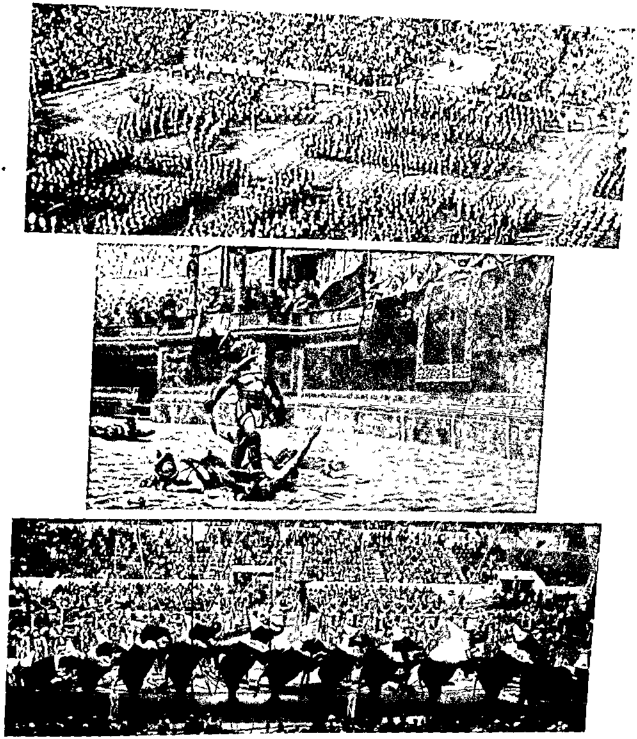


**FIGURE 3.4** Modern man is little different from his predecessors in his love for the diversion and entertainment provided by colorful and violent spectacles. (*Top*, half-time entertainment at college football game; *center*, "Pollice Verso," 1874, by Jean Leon Gerôme, now in Phoenix Art Museum, Phoenix, Arizona; *bottom*, Ringling Bros. and Barnum & Bailey Circus photograph.)

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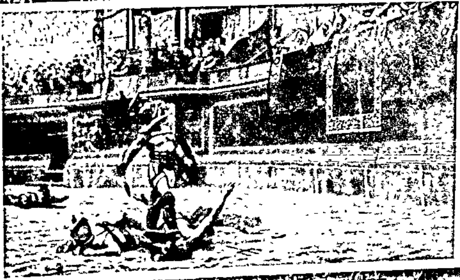

**FIGURE 3.4** Modern man is little different from his predecessors in his love for the diversion and entertainment provided by colorful and violent spectacles. (Top, half-time entertainment at college football game; center, "Pollice Verso," 1874, by Jean Leon Gérôme, now in Phoenix Art Museum, Phoenix, Arizona; bottom, Ringling Bros and Barnum & Bailey Circus photograph.)

society by automation will cause in his personal life. It is precisely this kind of problem that the professional recreation worker will be trying to help solve.

## THE FUTURE

In justifying the need for recreational leaders and recreational programs, authorities point to a number of factors of which we are all basically aware. The forty-hour work week may be reduced to thirty within the next ten years. Increased wages and the guaranteed annual wage (which has become a reality for more and more people) coupled with an unprecedented production have increased the spending power of millions. Unemployment rates have seasonal fluctuations, but unemployment insurance helps to reduce the difficulties encountered during such times. The population explosion has created a housing and a school crisis in the cities. The burgeoning social expectations of minority groups have produced a restlessness and a social mobility that is unprecedented in the history of the world. The combination of increased leisure, more money, and unfulfilled expectations is expected to produce social and economic problems whose solutions will require the dedicated efforts of a great many people. We can expect increased concern on the part of government and industry as well, and not always on the basis of objective humanitarianism. Concerning the relationships of recreation to the economy, *Fortune Magazine* reported: "The leisure market may become the dynamic component of the whole economy" (161, p. 393). In reviewing publications of the amounts spent by Americans for equipment and services related to recreation (such as the *Life* article, "A $40 Billion Bill Just for Fun"), Dulles came to the conclusion that "Play had to be considered a virtue for the sake of the nation's prosperity" (161, p. 392).

### Work and Play Today

As a consequence of the factors that have been mentioned (as well as others), the concepts of "work" and "play" in our society have undergone curious changes. This change is pointed out in Chapter 17 in terms of the implications it has for physical education in the schools. It has just as serious implications for nearly all other professions.

After reviewing the research in this area, Sessoms notes:

> *Traditionally, Western man has viewed work as the major determinator of social status, but with advanced technology and mechanization, work is losing its social importance. Increasingly . . . leisure has replaced work as life's central interest.*
>
> *For many, it is not an easy transition. There are feelings of guilt and shame; leisure has been for too long synonymous with idleness, and the prestige ascribed to adult play is woefully low. Work may not be meaninfgul but neither may be leisure* (506, p. 44).

". . . neither may be leisure"—this is the problem that faces the prospective recreation professional. The task

## SUMMARY

Examination of the current status of physical education reveals a strong emphasis on physical fitness for the masses of students while a concern for the teaching of physical skills is limited to a relative few. Highly talented individuals, especially those engaging in varsity sports, appear to receive the bulk of attention given to intensive skills training.

A brief historical survey indicates that the fitness objective has long been likened to the objective for preparedness for war. While fighting and hunting skills were prized in past ancient cultures, the early Greeks stand out for their remarkable contributions to physical education as well as to all other aspects of civilization. Few if any cultures have had as profound an effect upon the modern philosophies of physical education as that of the Greeks.

Other cultures, including that of the once-proud Roman Empire and some of those rising out of the dismal years called the Dark Ages following Rome's fall, have made contributions to physical education. With the Renaissance and the Protestant reformation, great strides were taken toward regaining the levels of civilization once enjoyed.

With the advent of improved education, ideas about the role of physical activity in man's life again stirred some interest. "Systems" of physical education gradually developed around individuals and came to be identified with specific countries.

With expansion of colonial territories in the new world, these systems became incorporated, adapted, and modified to blend into the new cultural setting. The phenomenal growth of population centers, educational systems, and economic opportunity provided by our civilization has created a culture that has affected American physical education in many ways. The rapidity of growth and the absence of clear-cut goals has placed physical education in the position of being forced to justify its very existance at a time in history when it should, theoretically, be making its greatest contribution. The challenge is clear and the opportunities will be great in the years immediately ahead. Realization of the potential contribution of physical education will be dependent upon the dedication and preparation of tomorrow's physical educators.

Health education, as distinct from interests in medicine itself, is really much younger than physical education. Practices of early people, including taboos and rituals designed to preserve health, were often specified by decree or custom. Aside from scattered records, little is known about efforts to educate people concerning personal health practices.

The origins of health education in the United States as well as its evolu-

tion can be conveniently traced by examination of the content of popular health texts from the early 1930s up to the present time. Recent years have seen a great expansion in breadth of health topics as well as intensified interest in new and more effective ways of making health knowledge a meaningful factor in human behavior.

The history of recreation is as old as play itself. From a formal standpoint, however, the festivals of ancient peoples give us our first glimpse of organized recreation. Physical education and recreation suffered common fates during the Dark Ages and the succeeding years. Religion played a large part in formulating attitudes toward work and play, with the latter being, for a time, practically equated with sin.

The Industrial Revolution, accompanied by economic development and increased leisure, gave birth to an upsurge in recreational interest and activity. In the United States, these conditions contributed to a tremendously increased interest in spectator sports. Modern automation has only accelerated the trend to greater economic growth accompanied by increased leisure. The concepts of work, play, fun, job have become less and less clear as profound cultural changes have occurred with increasing rapidity.

Heavy responsibility for helping to create new value systems for an age of leisure rests with today's recreation personnel. The significance of recreation in American life within the next few years can scarcely be overemphasized.

## PRINCIPLES

1. Attitudes of a populace toward the concepts of work, play, leisure, and recreation have profound effects upon the vitality and direction of the society.
2. Failure to utilize free time in a meaningful, satisfying way can contribute substantially to the decay of an otherwise sophisticated society.
3. Historically, concern for the physical fitness of any population has been linked to the objective of military preparedness.
4. Physical education takes on profoundly different values when viewed from the standpoint of dualism (mind versus body) as opposed to monism (a single, unitary being).

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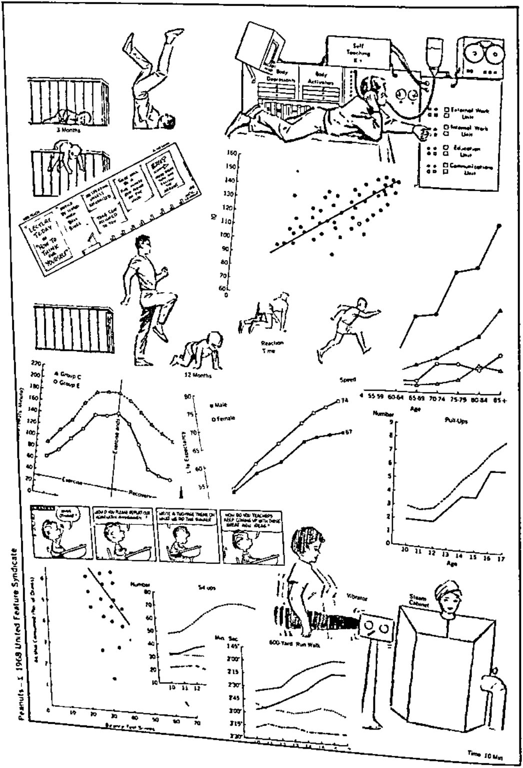

3 Months
Self Teaching Kit
Body Depressants
Body Activators
External Work Unit
Internal Work Unit
Education Unit
Communications Unit
IQ
Reaction Time
12 Months
Speed
Age
Number
Pull-Ups
Group C
Group E
Exercise
Exercise ends
Recovery
Male
Female
Life Expectancy
Sit-ups
Min. Sec
600-Yard Run Walk
Vibrator
Steam Cabinet
Time 10 Min
Peanuts - © 1968 United Feature Syndicate

# PART II

# Essential Understandings

# Critical, Systematic Thinking

## Chapter 4

The "Miss Peach" cartoon (Figure 4.1) says it. Our experience with college students says it. Students say it, and some have started to rebel against its repression. Some educators are enough concerned about it to try to do something about it. We have attempted to do something about it in our own classes. This book is an attempt to do something about it. What is "it"? "It" is the need for developing an atmosphere for creativity and critical, systematic thinking. Unfortunately, our educational system has for years promoted just the opposite: conformism and regimented, "Polly-parrot learning." Fortunately, formal education has never been 100 percent successful in converting all of its products to conformist automatons incapable of critical and creative thinking. But, in our opinion, it has been far too successful. We see an effort in many schools to get away from this kind of "education," which is really more like indoctrination. You are fortunate if you have come up through a system of schools where the problem-solving approach to education is in vogue or at least present to some degree. If you are not so fortunate, you will have to go through some kind of a conversion process. It can be a painless con-

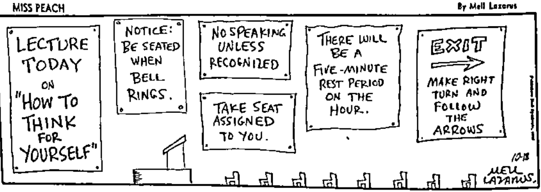



FIGURE 4.1 Miss Peach by Mell Lazarus © Field Enterprises Inc.

version because it would seem to us to be more in keeping with the nature of man to wish to be his own master, so to speak, and not to be an automaton. Perhaps not. Perhaps all persons are not built of such stuff. But it can be said with certainty that only the ones who can think creatively and objectively and who can use the problem-solving scientific process will be the true professionals in our fields (see page 12). The rest will be technicians; for the ability to think systematically, critically, and creatively is the earmark of the professional. The professional *can think effectively for himself. He can make decisions.*

## PROBLEM SOLVING AND DECISION MAKING

You have already learned something about making decisions. Although technically there may be little difference between making a simple "choice" and making a "decision," the difference is essentially one of the stakes involved. Thus, it may be relatively simple to choose which shoes one will wear with a particular suit but quite another matter to decide on whether to pursue a career in engineering, medicine, or education. Choice is often based on whim or fancy; wise decisions are based on facts.

As society becomes more and more complex, the range of decisions one is called upon to make increases. Thus, it has become necessary to develop ways of insuring that wise decisions are made. In business and government, when the stakes are high, complex and technical systems have been developed to aid in the process of decision making. The laws of probability have been utilized by the statistician and a whole field of study called "decision theory" has been born. Although the ordinary citizen does not have at his disposal the resources of industry, he can adapt the basic ideas successfully employed there to make appropriate decisions in his own life. It is important that we understand the scientific principles that can be applied to the problem of making sensible decisions.

There is nothing particularly complex about the application of these principles. A review of the steps that should be utilized in problem solving and decision making may be helpful.

## LOGICAL STEPS

The first step is to recognize the problem. One may be aware that things are not right but have difficulty in identifying what is wrong. In this case, some careful observation of the circumstances is indicated. A scientist might call this "preliminary data collection." This careful and more purposeful kind of observation should help in formulating a theory about what steps might be useful in identifying and overcoming the problem.

Next, armed with this knowledge of what conditions actually exist, a theory or hypothesis about the kind of action that appears to be desirable can be formulated. This hypothesis may be worded in predictive terms: "If situation A exists (as it appears might be the case), then action B should result in outcome C." The careful statement of the problem in the form of a hypothesis is a major step in the direction of solution of the problem.

Once the hypothesis has been set up, it should be a relatively simple matter to test it in order to see whether the predicted results actually occur. If they do, then the appropriate course of action is clear. If the expected result does not come about, the original theory should be adjusted in the light of the new facts available and a new hypothesis set up for testing. In this manner it is often possible to determine not only "better" decisions for important problem-solving action but often "best" decisions.

Let's take a look at an example of how an individual might go about applying some of these principles to a personal problem. Suppose Mr. X has recently graduated from college. As a typical student he has always been fairly active in extracurricular activities that have kept him relatively trim and fit. As fall rolls around, he discovers that all last year's winter clothes are too tight. About the same time he notices that he seems to be a little soft and bulgy around the middle. Taking his cue from these simple observations, he makes certain other preliminary observations. He consults the most recent height-weight tables provided by his insurance man and discovers that he is about fifteen pounds above the weight recommended for one of his height and general stature. His physician also tells him that he is indeed overweight and should reduce. In studying his diet in order to determine whether his caloric intake is excessive, he discovers that it is about the same as it was all the time he was attending college.

Like all of us, he has been the target of a great deal of advertising concerning the benefits of vibrators, diet foods, drugs, exercise fads, and other "packages" designed to get rid of unwanted pounds and to restore a youthful appearance. Unlike many of us, however, he has taken the time to check into some of the claims made for the various reducing systems and has concluded that weight gain or loss in the

normal healthy person is the result of the balance between caloric intake and energy expenditure.

One obvious course of action in this case is simply to reduce caloric intake to an appropriate level and to attempt to maintain weight by diet control. This, of course, implies the necessity of enduring moderate levels of chronic hunger, possibly for the balance of his lifetime. On the other hand, an increase in energy expenditure should aid in the reduction of excess weight. Mr. X reasons that because he has not changed his dietary habits since college days his weight problem must be the result of the reduced level of physical activity inherent in his occupation. He hypothesizes, therefore, that if he compromises by increasing his level of activity by playing handball or tennis three times a week and by reducing his caloric intake moderately, he should be able to regain and maintain a more desirable weight and still enjoy a sense of fulfillment at the dinner table.

(It should be noted that there are other possible courses of action open to Mr. X, all dependent, of course, on the approval of his physician. One possibility might be to change the composition of his diet from predominately carbohydrates to proteins. Another might involve the use of appetite-inhibiting drugs or the institution of a series of starvation diets. In this case, however, he has selected the elements that seem to be most advantageous to him and has manipulated them into a pattern he plans to test.)

Once under way, Mr. X keeps a regular weight chart in order to assess his progress. At the end of six months he discovers that he has lost eight pounds and has suffered no discomfort. In addition, the bulge around the middle has nearly disappeared. At the end of a year he finds that he has slightly exceeded his goal and that his weight-loss pattern has leveled off. His hypothesis has been proved to be true and his problem has been solved.

Other examples of the scientific problem-solving approach could be given, but they are all based upon the same general considerations. The single, most important step in the whole process is the formulation of an appropriate hypothesis. When knowledge of underlying conditions is limited, it is, of course, difficult to visualize other courses of action. It has been observed that "a proper construction of the question is often half of its solution." But in order to "phrase the question," or sometimes even before one can recognize that he *has* a specific problem, it is necessary to have some understanding of the basic facts. In terms of individual health and physical fitness it is important to know, for example, what the relationships are between physical activity and caloric balance. One needs to understand how the human machinery utilizes its fuel and how it responds to various changes in grade and amount of fuel.

For the solution of other kinds of problems relating to individual welfare it is necessary to be acquainted with certain other basic facts about how the body works, not only as a biological machine but also as a *person*, an integrated human being with needs,

desires, aspirations, hopes, and fears. This is not to say that one must become a physician or a psychiatrist, but only that it is important that we all become acquainted with certain basic things about how we work and think and learn.

Merely possessing this knowledge is, of course, not enough. It takes a little creativity, a willingness to manipulate and examine the facts in order to be able to come up with a properly phrased question—a productive hypothesis.

## ACQUIRING DECISION-MAKING ABILITY

In order to develop this ability to make intelligent decisions based on facts and knowledge of the process, practice is necessary. No one is born with the knowledge of how to solve his own (or anyone else's) problems. This is a task that takes practice just as any skill requires practice if improvement is to take place. For this reason you should take the opportunity to experiment with some particular problem as it relates to your own health and fitness. You will need to give attention to the techniques of observing the available information, formulating your hypothesis and collecting and analyzing your data. You will also need to learn how to avoid certain errors in drawing conclusions, and, finally, you should use your imagination in the general application of your findings.

It should be apparent that the decision-making process just described in no way rules out individual human judgment. On the contrary, it simply harnesses it and provides it with much more favorable operating conditions.

The steps used in this "do it yourself" approach are simple. First, be aware of the general problem to be studied. Next, hypothesize about the outcome of the experiment: What do you think the results will be? You will then engage in the actual collection of data, which you will then need to organize in a meaningful manner. This usually involves drawing a picture of the results in the form of a graph, as well as organizing the data into chart form. When more than one person is involved you will also want to convert the performances of individuals into a single mean or average performance. Following this you should be able to look back at your original hypothesis or theory and decide whether or not it has been supported. Finally, you should make some judgments about whether your findings have any practical or general application.

There is an infinite number of examples of situations in physical education, health education, and recreation that require "decision making in the face of facts." Some problems are obvious and *require* some kind of decision before any appropriate action can be taken. Others result from the professional's dissatisfaction with the status quo or his curiosity about a better way to do something or concern about whether his students are really learning. Listed below are some hypothetical examples of each kind of problem the professional may face.

### OBVIOUS PROBLEMS

There are too many serious injuries in our intramural touch football program.

An alarming percentage of our sophomores are contracting venereal disease.

Attendance in our recreation program has dropped off 42 percent in the last month.

A certain ninth-grade student has suddenly stopped dressing for physical education class without apparent reason.

Students have asked for a program in sex education but parents have a negative attitude.

Our community has a heart disease death rate and a mental illness frequency that are well above even the national averages.

### SILENT PROBLEMS

Are my students really assimilating the important health concepts? If not, how can I improve my program to that end?

Is each of my students as physically fit as he or she can be? If not, why not? Then, what can I do to motivate them to improve within their individual capacities?

Is there a better method than my current one of teaching swimming skills?

Is my recreation program really meeting community needs?

Are my basketball players properly conditioned, or is there a better way than I am currently using?

Does regular exercise cause changes in the heart muscle that make it more resistant to coronary artery disease?

These are but a few examples. How would you go about solving these problems or answering these questions? You can certainly add many, many more.

The general pattern for decision making can be applied in every case, but creativity will be required to select the specific approach that best fits the particular problem. Some will involve experimental research, others will require only an appraisal of the *existing* situation. But each involves the basic pattern: recognition and identification of the problem (which may involve preliminary observations and/or data collection); a formulation of an hypothesis; testing of the hypothesis by appropriate means (collection of data, experimentation); drawing conclusions and making a decision.

## REPORTING EXPERIMENTAL DATA

As an illustration of how experimental research data are commonly reported, a simple experiment, performed during a class period, is presented. A simplified version of the format used by many scientific journals is used as the model.

### AN EXPERIMENT IN HUMAN STRENGTH

I. Purpose: The purpose of this experiment was to observe the relationship between isotonic strength and isometric strength.

II. Hypothesis: The original hypothesis was that isometric strength should be found to be greater than isotonic strength.

III. Procedure: Six student volunteers

were selected from a class. Students were tested singly and were not permitted to observe each other's performance.

A. Isometric test. Each student, in turn, was required to stand with his back against the wall and his feet on a low platform about eight inches from the wall. A five-foot bar was placed in his hands (palms up) after the elbows were flexed to a measured angle of 90°. A chain and cable arrangement extended from the center of the bar to a spot on the platform directly between the ankles of the subject.

Each subject was asked to make a maximal attempt at further flexing the elbows. The tension produced in the cable under these circumstances was measured by means of a **cable tensiometer.** Results were recorded to the nearest pound.

B. Isotonic test. The subject assumed a position similar to that described above; the maximum amount of weight (to the nearest five pounds) that each subject could "curl" from thighs to chest was determined. A series of trials with approximately five minutes of rest between each trial was instituted to determine maximal isotonic strength (the greatest load that could be curled *one time*). The first attempt was made with 60 percent of the maximal isometric performance placed on the bar. For subsequent trials, adjustments were made in increments of five pounds. All subjects' maximums were determined within four trials.

IV. Limitations: The small number of subjects was a limiting factor in this study. The order of presentation of the exercise tasks may have produced a fatigue effect which may have distorted the results.

V. Results and Discussion:

A. Results. The raw scores of each individual are shown in the table below.

| SUBJECT | STRENGTH ISOMETRIC | ISOTONIC |
|---|---|---|
| 1 | 72 | 45 |
| 2 | 90 | 60 |
| 3 | 103 | 75 |
| 4 | 85 | 60 |
| 5 | 60 | 35 |
| 6 | 70 | 45 |
| Total | 480 | 320 |
| Average | 80 | 53 |

The graph in Figure 4.1 shows a comparison of isometric and isotonic strength. The mean isometric strength was found to be eighty pounds, whereas the mean isotonic strength was fifty-three pounds.

B. Discussion. The apparent difference may be due to the fact that the angle of attachment of the biceps muscle to the bone is very efficient at 90° but progressively less efficient in either direction from this position. Thus, moving the bar bell

through the full range, which begins at about 180°, where the angle of attachment is less efficient, is more difficult than exerting force at the single point of the relatively ideal 90° of elbow flexion.

VI. Conclusions and Implications: On the basis of the data *collected in this experiment* the following conclusions are drawn:

1. It appears that isometric strength is greater than isotonic strength, at least at 90° elbow flexion. It is possible that at other angles, isometric strength could be less than isotonic.
2. Under these conditions the isotonic strength would appear to be approximately 68 percent of the isometric strength.

It might be implied from this experiment that it is possible to exert more force through muscle contraction in slow movements than in more rapid ones.

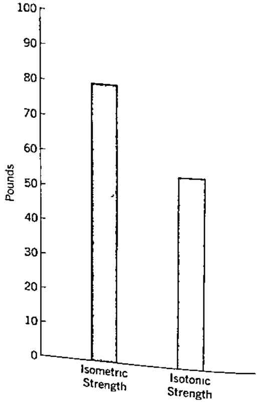
## CONSTRUCTING AND INTERPRETING GRAPHS

In the sample experiment above, a simple graph was used to illustrate the experimental findings. In this book, one of the techniques for facilitating your understanding of health and fitness information will be simply to present a table or graph that is self-explanatory and is not discussed at length. Despite the fact that graphs are widely used in popular magazines, newspapers, and books, many of us are not really graph-oriented. In order to assist those who have difficulty in interpreting graphic materials, several examples are presented below.

### THE BAR GRAPH

One of the simplest and most effective graphs for showing comparisons between groups or individuals is the bar graph. As shown in Figure 4.2, the message conveyed by such graphs is easily grasped. Here the average isometric strength of six men (eight pounds) is

FIGURE 4.2 A comparison of the means of the maximal isotonic and maximal isometric strength of six men.



represented by the bar labeled "Isometric Strength." The other bar represents maximal "Isotonic Strength," and extends upward until a value of fifty-three pounds is reached on the vertical scale.

In order to make the discussion of all graphs more simple, certain terms have been adopted to make communication easier. For example, the vertical scale on all graphs is called the *ordinate*. The horizontal scale is called the *abscissa*. Traditionally, the lowest or poorest scores of values begin at the bottom of the ordinate. When such a scale is used on the abscissa, the low values are placed at the extreme left and the high values at the right.

## THE LINE GRAPH

The line graph is another device commonly used to show changes in status. Here changes taking place over a period of time can be conveniently illustrated, as shown by the acceleration of the heart rates of the two groups shown in Figure 4.3. As can be seen, the average heart rate of the twelve men in Group E was 82 before the exercise began. As soon as they started walking on the treadmill, the heart rate began to increase. As the exercise progressed, the heart rate rose to a maximum of 160 beats a minute, where it leveled off and remained until the exercise was terminated. It can be seen that as soon as the exercise stopped the heart rates of both groups began to drop back toward normal. It should also be noted that the average heart rates of the men in Group E did not rise as high as shown for those in Group C, and also that Group E returned to normal more quickly than did Group C. In observing a plot like this we might conclude

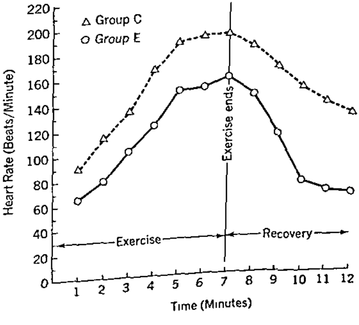



FIGURE 4.3 Mean heart rate responses to exercise of two groups of twelve men.

that the men in Group E were in better condition than those in Group C because they performed the standard task with less effort (as indicated by lower heart rates) and recovered from the exertion more quickly.

## THE CORRELATION PLOT

A device frequently used to illustrate the degree to which separate qualities are related is the correlation plot or scattergram. If we were interested in the relationship between IQ and academic success, for example, each individual in our study would need to have two scores: an IQ score and a cumulative grade point average. By arranging the possible IQ scores from low to high on the ordinate of the graph, and the academic achievement scores in the same manner on the abscissa, each individual can be represented by a single point on the scattergram. As shown in Figure 4.4, an individual with an IQ of 122 and a grade point average of 3.2 would be placed as indicated by the open dot. The solid dots all represent other individuals.

These questions now arise: Are IQ scores and grade point averages related, and if so, how closely? And is this relationship positive or negative?

It should be evident that if grade point averages went up one unit for every increased IQ unit, we would have a perfect positive relationship. All points would lie along one line and this line would form a 45° angle with either the ordinate (vertical scale) or the abscissa (horizontal scale). This would be a perfect positive correlation represented by a correlation coefficient of 1.0. Figure 4.5 illustrates such a correlation, indicating that academic achieve-

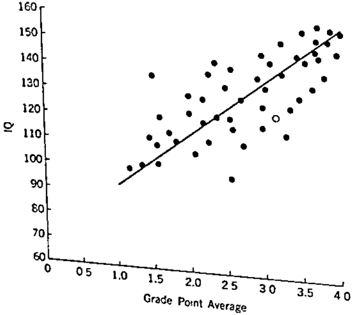



FIGURE 4 4 A scattergram comparison (correlation plot) of IQ and grade point average indicating the line of best fit. Open dot represents a student with IQ of 122 and grade point average of 3 2.

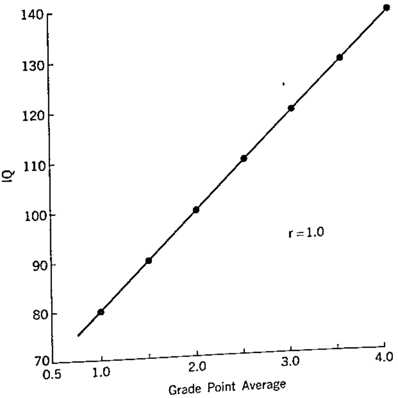



FIGURE 4.5 Hypothetical plot that might be obtained if IQ and grade point averages were perfectly correlated.

ment (as measured by grade point averages) is directly proportional to IQ.

Of course, two given factors are almost never perfectly correlated. A more realistic picture of the relationship between our two variables is shown in Figure 4.4. Here it will be seen that the scores, while forming a definite "directional" trend, do not all fall on the same line. A "line of best fit"[1] has been superimposed on this pattern to show the actual slope of the scattergram pattern. Because all points do not fall exactly on this line, and because the line does not slope at a 45° angle, the correlation is *less than* 1.0, and actually would be about .76. This is still a fairly strong correlation, indicating that there is a strong relationship between the two variables. That is to say, there is a strong tendency for those with high IQ's to attain better grade point averages.

Sometimes two items are related to each other, but in a *negative* direction. There is such an inverse, or negative, relationship between amounts of alcohol consumed and a test of balance (Figure 4.6). In this case a correlation of −.84 indicates strongly that the more alcohol one consumes the more poorly he is apt to score on the balance test.

If there is no correlation between two variables, the correlation coefficient approaches zero as shown in Figure 4.7.

There are other kinds of graphs, but these are the ones most commonly en-

[1] This can be calculated mathematically. There is only one line of best fit for a given set of points.

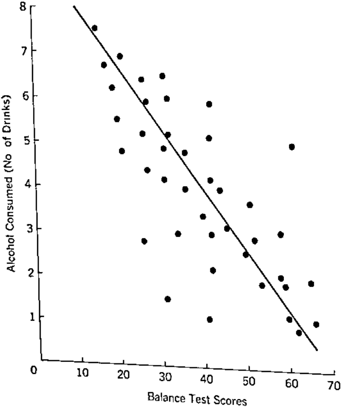



FIGURE 4 6 Hypothetical plot of scores on a balance test and amount of alcohol consumed. Line of best fit indicates a negative correlation.

countered. Sometimes a great many variables are all recorded on the same graph, so that considerable patience is required to determine exactly what is shown by the various curves. Interpretation of these more complex graphs is basically no different, however, from the interpretation of the simple ones just discussed; they merely require a little more study.

It should be pointed out that a high positive or negative correlation is not necessarily indicative of a cause-and-effect relationship. A correlation coefficient can be calculated or portrayed in a plot where two kinds of numerical scores are available, whether or not a real and practical relationship exists between the two measures. The classic example goes something like this: There is a high correlation between the number of storks per month flying over a large city and the number of births per month; this obviously is coincidence, not cause and effect, and does not prove that storks do, after all, bring babies! It may also be that two factors *are* related, not just coincidentally, but from the experimental data we cannot establish which is "cause" and which "effect." Be careful to use some common sense in interpreting correlations.

## CREATIVITY

It is our hope that you will have ample opportunity in your formal college

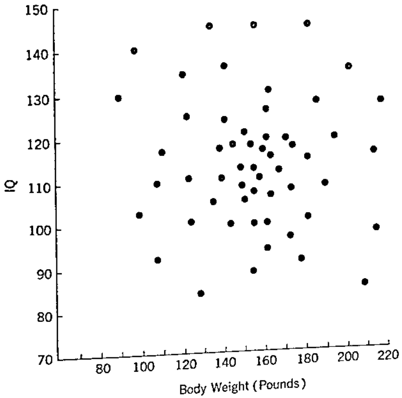



FIGURE 4.7 Hypothetical plot of IQ and body weight. No single line of best fit can be established; no relationship exists between the variables.

education to develop a creative, critical, and systematic approach to your profession. Given that opportunity, some will respond, some will not; some will become professionals, some will not. Of course it takes more than a knowledge of *how* to solve a problem or *how* to conduct an experiment or research project to be the complete professional. One must be alert to the subtle personal needs of the persons with whom one is dealing and to the program needs that *all too often are not very obvious.* One cannot assume that "no news is good news," that "no complaints from administration and no complaints from students" means that a program is sound and effective. This is where it takes a professional, a dedicated person who can and *will* think critically, creatively, and systematically. In other words, one cannot sit back and wait to solve problems that are brought to him. He must, as often as possible, seek them out and initiate solutions before they become any more detrimental to the welfare of the people involved and to the ultimate success of the program. This is part of the "creativity" aspect of the professional's job and is, of course, *directly dependent upon his interest in his program and its participants.*

The concepts presented in this chapter lead logically to a discussion of health and well-being of the individual because the creative and systematic thinking is ultimately directed at im-


FIGURE 4 8 © 1968 United Feature Syndicate.

proving programs so as to promote and improve man's well-being. In the next chapter, we will discuss health and physical fitness concepts as one of the specific and common concerns of health education and recreation.

## SUMMARY

The ability to think systematically, critically, and creatively distinguishes the professional from the technician. He can and should make intelligent decisions.

The professional must be alert to "silent" problems as well as those which have become obvious.

Use of appropriate bar and line graphs provides for better understanding of the data and their interpretation.

## PRINCIPLES

1. The problem-solving or scientific method involves recognition and identification of the problem or question, formulation of a working hypothesis, testing the hypothesis, drawing conclusions and making some kind of decision.

2. There is a basic format for reporting research results which insures that the essential elements are covered and which also facilitates follow-up research by other investigators.

3. A positive or negative correlation or relationship which exists between two variables may mean one of three things:

a. Nothing—the numerical manipulation provides a high correlation but the basic assumption is in error and thus the correlation is meaningless (example: high correlation between physical fitness and height when sample included ages 6 through 17).

b. Relationship is meaningful but "cause and effect" is not established (example: high negative correlation between daily activity and degree of obesity in rats; which causes which?)

c. Relationship is meaningful and "cause and effect" has been established (example: follow-up study to one in (b.) alone indicates that rats forced to exercise daily do not become as obese as those forced to remain sedentary; thus inactivity apparently precedes obesity and not vice versa).

## EXPERIMENTS AND EXPERIENCES

1. List some examples of variables which might be correlated but in a meaningless way.
2. Write up two research reports (one a survey, one an experiment) as follows:
   a. Identify a problem or question which interests you.
   b. State your working hypothesis.
   c. Describe the procedure in careful detail (as though you have carried out the study).
   d. Describe and graph three possible alternative results (two extremes and "nothing").
   e. Draw conclusions based on each of the three alternative results.
   f. Make a decision based on each alternative result.
3. Describe how you might apply the problem-solving method to a theoretical nonexperimental problem in physical education, health education, or recreation.
4. See how many examples of inappropriate use of statistics you can find.
5. Many of the experiments and experiences listed at the end of other chapters will also provide opportunity to develop the scientific, problem-solving techniques of inquiry.

## SUGGESTED READING

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Huff, D., *How To Lie With Statistics.* New York: W. W. Norton & Company, Inc., 1954.

Teraslinna, P., "On Publishable Research Articles," *Research Quarterly*, 38:154, 1967.

VanDalen, D. B., "Hypotheses and Deduced Consequences," *Research Quarterly*, 33:316, 1962.

# Health and Physical Fitness Concepts

## Chapter 5

In order to discuss *health* and *physical fitness*, the status of both, and the means of improving these qualities, we must come to some understanding of what these terms mean. We will operate on the basis of the following definitions, treating these qualities for the moment as though they were separate, distinct, and unrelated qualities (which, in reality, they are not). Health is generally taken to mean "freedom from defect and disease" or, in a more positive sense, "mental and physical well-being" or "soundness of body and mind." Physical fitness, although there are many and varied definitions, each with its own peculiar tangent, is generally taken to mean "the capacity to carry out physical tasks" (especially those tasks requiring considerable muscular effort, which tasks in turn require a well-conditioned neuro-skeleto-muscular system and/or circulo-respiratory system).

We will first take a look at our current health status, then discuss some misconceptions about physical fitness before analyzing current fitness status. We will then direct attention toward the theoretical relationship between health and physical fitness, the effects of regular exercise on health (longevity,

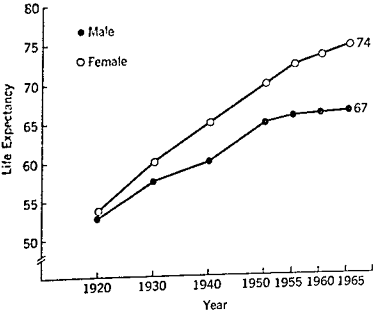


**FIGURE 5.1** Life expectancy for men and women in the United States, 1920-1965. Adapted from *Statistical Abstract of the United States* (578)

resistance to infection, and so on), and, finally, will discuss health appraisal.

## CURRENT HEALTH STATUS

It is difficult to find incontrovertible evidence regarding the actual causes of gross population changes in health status. We can, however, identify relevant facts and figures. These data, coupled with discrete observations and new statistics presented from time to time, can aid in the process of deduction. You can then reach some logical conclusions of your own. These conclusions, in turn, can be interpreted in the light of health needs. Again, we have employed the problem-solving technique: the data are presented in simplified form, thus challenging you and allowing you to reach your own conclusion as to the meaning of each particular table or graph. Study each table and illustration carefully and ask yourself, "What does this imply?" You should be looking for answers to many questions: What are some of the most likely causes of our national health problems? Are automation and overmechanization involved? Do not expect simple answers; in some cases the evidence is conflicting. There are not enough pieces to complete most of these puzzles, but each piece of evidence presented does somehow fit into the larger puzzle; ultimately all conflicts will be explained on the basis of new and better studies. At present, these conflicts are actually good and essential: they promote further and more careful work that will lead to better answers. In some cases, you may be able to resolve and explain an apparent paradox. In any case, you will be armed with more information

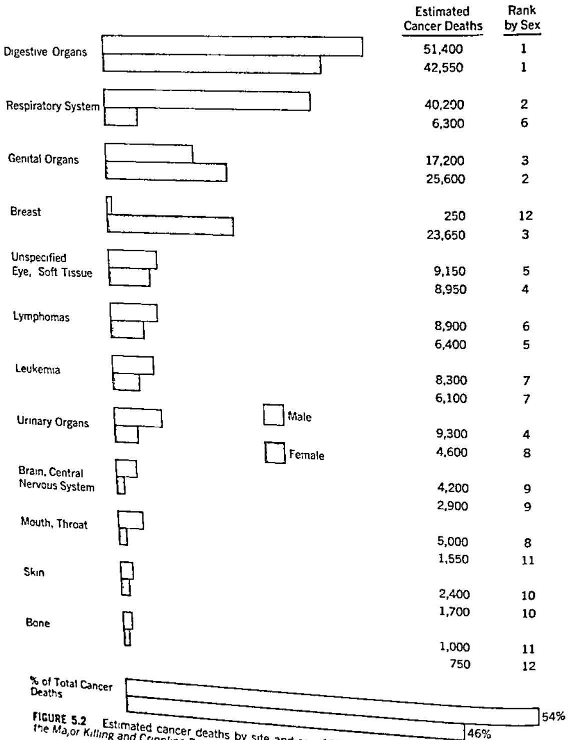


**FIGURE 5.2** Estimated cancer deaths by site and sex, 1964, United States. Data from *Facts on the Major Killing and Crippling Diseases in the United States Today* (172).

with which you can better interpret current and future scientific developments as they are reported, and you should come to a better understanding of our current health status and how it can be improved.

**TABLE 5.1 Selected Causes of Death in the United States, 1900-1965 (Deaths per 100, 000 Population)**

| CAUSE OF DEATH | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 | 1965 |
|---|---|---|---|---|---|---|---|---|
| Major cv—r[a] diseases | 345 | 372 | 365 | 414 | 486 | 511 | 522 | 516 |
| Heart | 132 | 159 | 159 | 206 | 295 | 357 | 369 | 367 |
| Arteriosclerotic heart disease | — | — | — | — | — | 213 | 276 | 287 |
| Cancer | 63 | 76 | 83 | 97 | 120 | 140 | 149 | 154 |
| Influenza and pneumonia | 203 | 162 | 208 | 103 | 80 | 33 | 37 | 32 |
| Diabetes | 10 | 15 | 16 | 19 | 27 | 16 | 17 | 17 |
| Cirrhosis of the liver | 13 | 14 | 7 | 7 | 8 | 9 | 11 | 13 |
| Ulcer | 3 | 4 | 4 | 6 | 7 | 6 | 6 | 5 |
| Tuberculosis | 194 | 154 | 113 | 71 | 46 | 23 | 6 | 4 |
| Bronchitis | 46 | 23 | 13 | 4 | 3 | 2 | 2 | 3 |

[a]Cardiovascular renal
SOURCE: U S Bureau of the Census (578)

**TABLE 5.2 Days of Disability Due to Chronic Disorders, per Year per 100,000 population, United States Average for 1958 and 1959**

| CAUSE | RESTRICTED ACTIVITY | RESTRICTED TO BED | WORK LOSS | SCHOOL LOSS |
|---|---|---|---|---|
| C-v | 269 | 93 | 100 | 6 |
| Digestive | 115 | 42 | 75 | 3 |
| Arth.-rheumatoid | 141 | 36 | 46 | 0 |
| Other | 738 | 236 | 327 | 81 |

SOURCE U S Bureau of the Census (578)

**TABLE 5.3 Average Prevalence of Selected Chronic Conditions, Number per 1000 Population**

| CONDITION | 1957-1959 | 1959-1961 |
|---|---|---|
| Heart disease | 29 5 | 30 2 |
| High blood pressure | 30 8 | 32 3 |
| Ulcer | 14 4 | 15 9 |
| Arth -rheumatoid | 63 9 | 65 6 |

SOURCE U S Bureau of the Census (578)

TABLE 5.4 Selective Service Statistics, Percent Rejected, World War I through 1965

| | WW I | WW II | 1950-56 | 1958 | 1960 | 1962 | 1963 | 1965 |
|---|---|---|---|---|---|---|---|---|
| Rejected | 21 3 | 35 8 | 33.5 | 41.9 | 44 8 | 49.8 | 50 0 | 44 0 |
| Medical only | – | – | 15 7 | 19 0 | 22.1 | 22.7 | 24 0 | 21 8 |
| Mental only | – | – | 13.6 | 18.0 | 18 8 | 21 5 | 21.6 | 18 6 |
| Both | – | – | 3 l | 3.3 | 2.9 | 3 0 | 3 1 | 2.3 |

SOURCE U S Bureau of the Census (578).

## HEALTH KNOWLEDGE

No discussion of current health status would be complete without some consideration of what kind of knowledge our population has about matters of health. This leads us to consider the question of medical quackery and old wives' tales. To further acquaint you with the problems associated with the public's lack of health knowledge and wisdom, two excellent articles are reproduced here.

### Health Education vs. Medical Quackery*

JAMES L TRAWICK
DIRECTOR, DIVISION OF CONSUMER EDUCATION
BUREAU OF EDUCATION AND VOLUNTARY COMPLIANCE
FOOD AND DRUG ADMINISTRATION

Children learn at an early age that there is a certain amount of dishonesty and fraud in the business world. My 9-year-old son suffered a disappointment bordering on shock when he received a toy he had seen ballyhooed on television. The difference in what he had expected and what he actually got was remarkable indeed. That same youngster has now learned to be wary of the cereal box-top come-ons, after similar disappointments. Come to think of it, he is pretty sophisticated in his small world as a consumer.

Likewise, my teenage son has learned some lessons about gasoline additives to double your mileage and so-called high-powered spark plugs advertised to the high school set. When I was his age, I had no car, but I had freckles. Freckles were not as socially acceptable then as they are now, and I learned a few things about cosmetic advertising after spending several dollars on freckle cream.

If there is any bright side to this kind of experience, perhaps it is simply in the "once burned, twice shy" adage, since such experiences may help to immunize young people against the bigger—and more dangerous—types of fraud they will meet up with as they grow older.

In the health field, we call this kind of fraud and cheating "quackery." The definition is important because by today's usage, quackery refers not only to the quack practitioner but also to the worthless product and the fraudulent promotion.

It is not a life-or-death matter if the teenage debutante does not get the results she expects from a bust developer or an acne

*From the *Journal of Health, Physical Education and Recreation*, 36 28, 1965, by permission of the American Association for Health, Physical Education, and Recreation.

lotion, or if the tanning preparation used before the high school prom leaves her face covered with orange-red splotches a few days later. But it may be a life-or-death matter if a few years later that same young woman discovers a lump in her breast and decides to try out some quack remedy because she is afraid to tell her doctor about it.

The knowledge of how to seek competent medical advice in such a situation, how to evaluate labeling claims and advertising, books used in promotions, articles in magazines, claims of so-called health lecturers and of house-to-house peddlers, and radio and television promotions—such knowledge may in fact be the most important health education message that youngsters can be taught today. I am not going to presume to tell you as professional teachers how to do your job of teaching. But I think you will be interested in some of our material on the subject of health education as it relates to medical quackery.

These are true-life cases from FDA files. For example, consider the outer carton from a package of Nutri-Bio—a vitamin-mineral preparation containing a number of miscellaneous ingredients such as unsaturated fatty acids, bioflavonoid complex, alfalfa juice, and various minerals and trace elements. Back in 1961 and 1962 Nutri-Bio was promoted with labeling statements that "the American people are the most undernourished people in the world even though overfed" and that Nutri-Bio was of special dietary value because the ingredients were of natural or organic origin.

I mention this type of product first because nutritional quackery is an important subject for teachers, and yet a difficult one because of the well-known atrocious dietary habits of teenagers. This is complicated by the fact that children nowadays have been brought up on vitamins (it used to be cod liver oil) and many of us are conditioned to believe that supplementary vitamins and minerals are an absolute must for everyone if he is to enjoy good health. This is not so!

The fact is that food faddism and nutritional quackery rank as the biggest racket in the health field today. This quackery thrives on the major themes of the food faddists—and the willingness of people to believe them. These are:

1. That all diseases are due to faulty diet;
2. That soil depletion and the use of chemical fertilizers cause malnutrition and poison our crops;
3. That modern methods of food processing and cooking have robbed our foods of their nutritional value; and
4. That anyone who has the "tired feeling" or an ache or a pain is probably suffering from a "sub-clinical deficiency" and needs to supplement his diet with some special concoction.

Nothing could be further from the truth. While there are, of course, special circumstances in which dietary supplementation is necessary, advice of a competent physician is needed to identify vitamin or mineral deficiencies and to prescribe their proper treatment.

The promotion of Nutri-Bio a few years ago provided a classic example of food faddism gone wild. More than 75,000 full and part-time sales agents were selling Nutri-Bio at $24.00 per packet for a six-months' supply for one person. The promotion involved one of the largest collections of pseudo-scientific literature and books ever assembled. Nutri-Bio was being recommended as the answer to practically all health problems—anemia, arthritis, cancer, diabetes, heart troubles, nervousness, and so on. It promised health, beauty, athletic ability, radiant living, and the capacity to stay young and vital. It was even recommended as a cure for juvenile delinquency. The sales distribution plan was based on a chain-letter type scheme and many people

# Principles of Modern Physical Education, Health, and Recreation

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# Preface

Our purpose in writing this book has been to provide for students planning careers in health, physical education, or recreation an introduction both to the scientific core of information about human physical activity and health-related behavior and to the philosophy, procedures, and purposes that we consider relevant for professional experience in the disciplines these students have elected to follow. We have wanted our book to serve the needs of teachers and students who are seriously involved with the very foundations of health, physical education, and recreation.

Like all of today's college students, majors in physical education, health, and recreation reflect the strengthening of academic standards throughout the school system. They also exhibit the increased sophistication characteristic of earlier physical and social maturity. Although the complexities of modern life have multiplied the pressures placed upon them, there is little doubt that young people are better prepared than ever before to cope with the problems left to them by preceeding generations.

Today's students come to college not only academically well grounded, but also philosophically committed to idealistic goals. It is now up to the colleges and universities to give these eager young recruits the modern weapons and training they will need if they are to be successful in attacking the crucial problems they will have to face. It is increasingly clear that their success (and the survival of their professions) depends upon their ability to establish themselves in the minds of the public as *knowledgeable experts* in matters of human physical activity and health-related information and behavior.

We believe that if students are to develop an adequate expertise in their profession, they must first develop a healthy self-respect based upon pride in their *potential* professional contribution. The fostering of this desirable self-image can best be facilitated through early exposure to the true *substance* of the profession. In expressing this philosophy, we have wanted:

1. To introduce the student to his chosen profession by indicating not only what his profession is, but also what it can become.
2. To provide a practical handbook of important principles and a useful source of documented information for the use of the student throughout his preparatory training as well as for the graduate on the job.
3. To establish an integrating element that could function to help the student perceive the relationships among the many courses he will encounter during his professional training.

As a means of organizing some of the ideas contained in this book we have utilized two terms borrowed from the field of neurology. The expression EFFERENT CONCEPTS has been used to identify those ideas dealing with the effects that physical activity and health-related behavior have upon man's biological function, his social conduct, his philosophy, his art, and his culture in general. Conversely, AFFERENT CONCEPTS refer to those ideas that are concerned with how man's physical makeup, his environment, his philosophy, and his culture act to influence, modify, or direct human physical activity and health-related behavior.

As a further attempt to aid students in understanding the material presented, an extensive glossary is included. As each technical term is introduced it appears in boldface, indicating that a definition can be found in the glossary.

So as to distinguish the present effort from the earlier book entitled *Physical Education: A Problem-Solving Approach to Health and Fitness* (Holt, Rinehart and Winston, Inc., 1966), which resulted from a collaboration

with our colleagues Donald Stolberg and Maryellen Schaefer, we should like to emphasize that the 1966 work was written as a text for a new type of combined health and physical education course, one directed more specifically to students not concentrating professionally in health, physical education, and recreation. It was inspired by the idea that today's more mature, intelligent college student deserves to be given the opportunity to study and evaluate for himself the available evidence concerning human physical activity and behavior related to health and fitness.

Many people agreed that this kind of information is valuable for the general student but pointed out that it is of even greater importance for the student preparing to work professionally in health, physical education, and recreation. The obvious objection to the use of the first book for majors has been, however, that it is addressed to a different audience and fails to consider several topics of particular importance to professional students.

Thus, in this book, which is designed for majors, we have deliberately retained significant portions of the scientific content from the 1966 volume and even expanded them considerably into the fabric of the preponderance of new material making up the present text.

We would like to express our appreciation to the many fine people on our own faculty and to those at other institutions who have contributed so much to the genesis of the ideas expressed in this book. Dr. Donald Stolberg has been a particularly stimulating co-worker, and many of his ideas have found their way into this text. We are grateful to several other dedicated professionals whose imaginative work with the introductory majors' course at the University of Toledo has contributed in many ways to our writing of this book. Dr. Harriett Williams, Dr. John Drowatzky, Dr. Jack Schendel, Dr. John Burt, Dr. Jan Broekhoff, and George Gilmore have all made valuable contributions to the philosophy and content of our program at this level.

Our thanks are also extended to Dr. Marguerite Clifton of Purdue University, Dr. Marvin Eyler of the University of Maryland, and Dr. John Cooper of Indiana University, whose many sound criticisms and suggestions for changes in our manuscript have contributed to its substantial improvement.

To Dan Wheeler, of Holt, Rinehart and Winston, we express our appreciation for his enthusiastic encouragement and knowledgeable advice. We would also like to thank Jeanette Ninas Johnson for her advice, patience, and very real assistance in putting this book together.

Finally, we are grateful to our wives, June Updyke and Ann Johnson, for their loyal support, encouragement, and frequent unselfish assistance in this undertaking.

W. F. U.
P. B. J.

*Toledo, Ohio*
*October 1969*

# Introduction

Times are changing rapidly. The ever increasing complexity of society demands that we expand our understanding of man and his world if we hope to survive as individuals and as civilized nations. At the same time that pleas for increased breadth of knowledge are being raised, there arises an insistence upon increased professional and technical specialization. The beleaguered student is caught in the middle.

Today's college student, whatever his major field of interest, is expected to master facts and concepts that will give him far greater expertise upon graduation than has been possessed by preceding generations. In becoming an expert, however, the student has found it impossible to pursue as wide a variety of interests as once was possible.

Few people would deny that physical education, health education, and recreational leadership have become distinct and separate professional specialties. There is simply too much of a specialized nature within each field to expect one individual to become adequately prepared in more than one of them in four years. Recognition of this fact has led to the establishment of separate curricula for the preparation of professional workers in each of these areas.

It is not surprising to discover that these curricula contain certain very important common elements, since the three professions share several of the same important objectives. All three professions, for example, are directly concerned with helping man to understand himself and his biological and psychosocial needs. All three are devoted to fostering habits and techniques that will serve not only to help preserve man's health but also to enable him to achieve a full, satisfying life.

The purpose of this book is to provide students with a summary of concepts and principles important to health educators, physical educators, and recreation leaders alike. This is not meant to imply, however, that every concept and principle discussed in the text is considered equally important to each of the professions. Neither is it assumed that all important concepts and principles have been covered, or that judgments made concerning the placement of emphasis are infallible.

We do believe that each chapter in some way provides a substantial portion of the general foundation that must undergird the more specific knowledge and skills of persons embarking on a career in health, physical education, or recreation, and that there is no concept or principle presented that does not hold significance for at least one (if not all) of these professions.

Chapter 17 (Concepts Underlying Special Programs) provides an example of material that is not of equal concern to recreation specialists, to health educators, and to physical educators. While only members of the latter group would be expected to become actively involved in physical activity programs for the atypical child in school, health educators must certainly be aware of the need for such programs and should be intimately concerned with fostering sound philosophies of physical education and recreation for atypical persons as an integral part of the total health education program. Recreation leaders will be increasingly called upon by communities to provide facilities and programs for handicapped youngsters and adults; knowledge of appropriate opportunities, as well as understanding of the limitations imposed by various conditions is essential to the provision of meaningful programs.

Other examples of mutual concern are provided in the brief sections dealing with diseases and disorders of the various systems, and those related to exercise concepts. In the case of diseases and disorders, awareness of these matters may be of pratical significance to the practicing physical educator and recreation specialist even though knowledge of such disorders may be of more direct concern to the health educator. In the second instance (exercise concepts), physical educators will regard concepts pertaining to physical activity as being of paramount importance. The potential health benefits and dangers of various kinds of exercise and physical activity will also be of more than passing interest to the health educator. The recreation leader will make considerable use of such infor-

mation in planning sound, effective programs to meet the leisure needs of the community.

As a summary of principles and a review of important concepts, it is apparent that this book is intended to go beyond serving as an introduction to the professions involved. It is hoped that as you progress through your academic programs, its pages will provide practical assistance in the development of projects and that its many references will serve to give initial direction in the search for further information for papers and presentations. When you near completion of your training, we hope this book will assist you in integrating the detailed and widely divergent aspects of your preparation. And as you begin your professional career, you will find it useful as a review of pertinent ideas and important professional responsibilities and objectives.

Because it is meant to be more than an introductory text, we have included brief sections dealing with procedures and programs. The chapters in Part IV (for example, Essential Emergency Procedures, and Selected Issues) are intended to provide some exposure to these less conceptual but nonetheless basic concerns of the true professional.

It is hoped that this book and the philosophy out of which it has developed will help to identify and strengthen the common goals of physical education, health education, and recreation leadership in order that through their separate, unique contributions these professions may fully achieve their potential for the improvement of man and society.


THE BLADE: TOLEDO, OHIO,
Rewarding Experience
Alcindor Working With Underprivileged Youngsters

# PART I

# Essential Backgrounds

# The Prospective Professional

# Chapter 1

## VITAL QUESTIONS

"Why am I here?" "Why have I chosen a career in physical education—or health—or recreation?" These are questions that each person should ask himself early in his educational career.

There are, of course, any number of possible answers to such questions. However, the nature of these answers may be of vital importance to you and to your profession as well.

Some categories into which typical answers fall are:

1. The desire to pursue personal interests and aspirations; to do something one enjoys.
2. The desire to influence the behavior of others; to achieve acclaim or status.
3. The desire to be of service to others who need assistance.

It is obvious that one's motives might involve all of these desires. It is equally possible, however, that a given individual might enter a profession primarily motivated by one of them. It is conceivable, for example, that one might choose to become

LEW ALCINDOR
*Finds youth stimulating*

# Rewarding Experience

★ ★ ★ ★ ★ ★ ★ ★ ★

## Alcindor Working With Underprivileged Youngsters

NEW YORK (AP)—Lew Alcindor, who could now be getting ready to lead the U.S. basketball team in the Olympics, is working instead with the underprivileged youngsters of New York.

"I don't know of anything I've done yet that's been more rewarding," he says "We know what we've done has worked. It's been that good. It's wonderful."

This is the same man who not long ago said of his decision not to try out for the Olympic basketball team:

"We have a racist nation and my decision not to go for the Olympics is my way of getting the message across."

Alcindor, the 7-foot plus center of UCLA's collegiate champions and already considered one of the greatest of modern basketball players, was a cinch to make the Olympic team.

He is now part of Operation Sports Rescue along with other famous athletes. Teams each headed by an athlete talk to youngsters in small groups.

"Young people idolize athletes," says LeRoy Wilkins, director of the project. "If you can get athletes to say the same thing that religious leaders and educators are saying, they'll listen."

The objectives of Operation Sports Rescue are to instill self-pride in youngsters of the street, to impress on them the value of remaining in school, to underscore the value of independence by acquiring marketable skills, and to encourage youngsters to take an active part in community affairs.

Among the athletes working on the project in addition to Alcindor are Emmette Bryant of the Boston Celtics, Ron Blye of the New York Giants, Tom Hoover of the Houston Mavericks, Bobby Hunter of the Harlem Globetrotters, Carlos Ortiz and Jose Torres, the boxers, Oscar Robertson of the Cincinnati Royals, and Walt Bellamy of the New York Knicks.

"Alcindor has worked almost as much as all the rest put together," said one of the project officials.

Operation Sports Rescue is sponsored by the Mayor's Urban Task Force and financed by the Bristol Myers Co

FIGURE 1.1 As they become mature, most great athletes become interested in identifying with a "cause" that is greater than self. (Copyright AP; photo, World Wide Photos.)

a health educator because he loves biology or immunology. A love of history might lead another to become a history teacher. A successful high school athlete might choose to enter physical education because he loves sports competition.

The question is, have we chosen this profession because we wish to prolong pleasant experiences in our own lives, or is it that we wish to extend to others the benefits of enjoying for themselves the kinds of experiences we have found meaningful and pleasurable?

Maturity brings changes in philosophy and objectives. It has been said of the typical athlete that when he is young, he wants to be *good*; as he grows older, he wants to be good for *something*. This increasing awareness of the influence that he can have on others through his athletic achievements can lead him in many different directions. Figure 1.1 illustrates the fact that many people who have achieved athletic fame find even greater rewards in forgoing the pursuit of further public acclaim in favor of giving of themselves to others who really need help.

It is doubtful that maturity can be gained by any means other than personal experience. Therefore, the only real justification for pointing out the matters discussed in this chapter is that responsible decisions (if and when they are made) depend upon the avail-

ability of accurate information. On the other hand, if one is to really profit from his educational experiences, he must approach them with a sense of perspective that makes the various courses take on meaning.

At the very beginning of a career it is important to have a serious talk with oneself. It is important to make some definite decisions now (painful though the process may be) about what your real goals in life are. In making these decisions you are really spelling out your philosophy of life. Do you wish to serve others or to be served? Are you anxious to become a coach or teacher or recreation leader in order to be in a strong position to exert an influence in the lives of youngsters, or does this kind of life appeal to you because of the opportunity it gives you to stay in the environment you love? Steinhaus has said that the person who is interested in getting the most dollars does not have the instincts of a teacher (543, p. 256). This does not mean the teacher should not expect fair remuneration for his expensive training and important work. It does mean that if his goal is the gathering of material goods, he does not really have the capacity for putting other people's welfare ahead of his own.

At this point it should be pointed out that no good coach or teacher is entirely unselfish in his motivation. Of course he is fond of the subject he is teaching. Of course he loves the excitement of hard fought contests. But he recognizes that these experiences must be directed toward meeting the needs of the youngsters rather than meeting his own needs. In other words, the truly *professional* person recognizes that his primary responsibility is the improvement and nurture of the student; the


FIGURE 1.2 "Maybe I ought to become a surgeon . . I've always enjoyed cutting and stitching"

professional's own enjoyment and even his professional advancement must be secondary considerations. And certainly neither his enjoyment nor his advancement are ever to be attained at the expense of his students.

In learning to subjugate one's own selfish interests to the best interests of others, many people have found unexpected rewards. No one would deny the thrill to be gained from putting a team of talented performers together and guiding them step by step to victory. Even more gratifying, however, can be the experience of developing the capacity to analyze the subtleties in complex performance and then to creatively utilize this knowledge in producing performers when there were apparently no performers. Anyone can slavishly initiate the systems of others, but what could be more soul satisfying than being the originator of a concept, system, or idea? Anyone should be able to win with good material, but what can be said of the man who can win with players who began as only mediocre performers? And what of the person who uses his influence to expand the creative imagination of an "ordinary" child? That man has the qualities of a *teacher*!

As soon as one begins to direct his thinking in terms of his profession as a service to others, it becomes obvious that the number of youngsters he can help is much larger than he may have realized. Although interscholastic athletics can directly involve a few elite performers, all of the students in a school system profit from a well-conceived program of physical education. Because the life of a normal child is intimately bound up with physical activity, physical educators, recreation leaders, and health educators take advantage of every opportunity to utilize natural urges and desires in achieving a variety of worthwhile educational objectives. However, this must not be understood to mean that such objectives will automatically be achieved. We will have a great deal to say later on about the necessity for careful planning and preparation, if *any* of the potentially valuable outcomes of physical education, health, and recreation are to be realized.

## INTERRELATIONSHIPS OF THE PROFESSIONS

To someone who has thought of physical education only in terms of the opportunities it provides for the teaching of motor skills and coaching, it may not be clear what physical education has in common with health education or recreation education. On the other hand, if it is recognized that regular physical activity of appropriate kinds has a profound effect on the physical welfare of all people in terms of growth and development and on the prevention of certain degenerative diseases, it becomes obvious that the positive health of people ("preventive medicine") is a common objective of both physical education and health education. Furthermore, the kinds of activities we engage in during our leisure hours, the types

of diversions we pursue as a means of maintaining our sanity in times of stress, are mutual concerns of all three professional areas. Certainly all three are ultimately concerned with the well-being (physical, mental, and spiritual) of the individual. The means utilized in the attainment of these lofty objectives may vary considerably, and the place within the community where these objectives are sought may also be different. But to the extent that all three are concerned with frequent use and knowledge of physical activity in meeting the physical, mental, and spiritual needs of human beings, they are related.

It is also important to recognize that because of the fact that physical education, health education, and recreation are all concerned with the effects of their programs on man's welfare, they all require training and background in the physical and psychological makeup of man.

Certainly it would be foolish to presume that there are no major differences in the three programs under discussion. Although there may be even greater differences developing as changes occur in our society, there are still sufficient similarities to justify a common core of early training experiences. For this reason it is assumed that the readers of this book will represent all three professional areas, and it is hoped that even though illustrations and examples may be taken from one or another particular field, it will be realized that the principles involved are intended for physical educators, health educators, and recreation specialists alike.

## THE QUESTION OF "MEANING"

After Hillary first conquered the terrifying heights of Mount Everest, he was asked why he would take such terrible risks and subject himself and others to such hardships in order to reach the top of a mountain peak. His famous response of "Because it is there!" seems, somehow, unsatisfactory. To most of us, sports, games, and other vigorous activities are *means* to the achievement of some goal rather than *ends* in themselves. Sometimes our actual purposes or goals may not be clear even to ourselves, but generally we can identify some motive for our actions such as the physical challenge involved, love of competition, desire to excel, better health, fitness needs, or, simply, the pleasure derived from success.

Because it is possible to derive different kinds of outcomes from a given activity, it becomes necessary for the educator to decide what specific outcomes he wishes to produce. How does one go about deciding what his specific aims are? Or should one simply provide instruction in the desired skills and give people the opportunity to participate and let *them* worry about the outcomes of this kind of behavior?

In physical education, for example, there are teachers who have no desire to get involved in the questions of "meaning" in physical activity. Their only concern is to teach people *how* to perform certain activities. The development of skill is their ultimate and only objective. Whether or not the learner continues to utilize the skills, whether

he derives any social, psychological, or physiological benefits, or whether he understands that there may be some such benefits are of no concern to this individual.

On the other hand, there are teachers who are deeply concerned about the values that students may be developing through participation. These teachers spend considerable time and effort in organizing their instruction so that skill development is accompanied by the acquisition of physical fitness. They strive to be certain that students understand the benefits and limitations of specific activities in terms of fitness and other factors. These teachers are concerned with the function of physical education in the total educational picture. These two types of teachers (those concerned with "meaning" and those not) are representative of two divergent philosophical viewpoints that characterize not only physical education but also health education and recreation.

## TECHNICIAN OR PROFESSIONAL?

To view the physical educator, health educator, or recreation leader as a technician means that he deals primarily with techniques. There is no implication that the *quality* of his work is inferior. There are excellent technicians and there are poor technicians; their distinguishing characteristic is that the *scope* of their activity is comparatively narrow. The technician's responsibilities are limited to the actual implementation of a program. He *administers* the activities that are set up by someone else. In some cases he may actually select the activities in his program, but this selection is based on the fact that they are being used by someone else. In short, the technician is concerned only with the practical matters of getting the program across to the students. He is not really concerned with *why* particular activities are presented at a certain level in the curriculum. The *theoretical* aspects of the function of his profession are neither his concern nor his responsibility. Someone else makes the decisions about what is "good."

The philosophical considerations and analytical processes that go into determining *why* the technician is teaching what he is teaching are the hallmarks of the professional. He must have the depth and breadth of knowledge to understand the needs of people and the means by which these needs can best be satisfied. He must be able to critically evaluate the effects of his program and make appropriate revisions. His *number one* characteristic is capacity for critical thought and analysis. He must be able to answer the question "Why?"

It is probably true that some people are more suited to the role of the technician than to that of the professional, and vice versa. It is apparent, for example, that most athletic coaches are technicians. How many different offensive formations or systems are in use in football today? Presently, the I formation (in which three backfield men line up directly behind the center and in which the fourth splits out to one side or the other as a potential pass receiver) is coming to the peak of its popularity. A few years ago nearly every

team in the country was using something called the split T. Prior to that we had the T formation that "revolutionized football." The old single wing is now nearly forgotten, and many players today have no idea how it would operate. Yet there was a time when it was considered the ultimate weapon of the game. (Similar "band wagon" phenomena could be identified in health education and recreation.)

Why do these changes occur? Do they just happen by coincidence? Is it a kind of spontaneous combustion? Or is there someone, somewhere, who has carefully studied the structure of the game and has analyzed, on a theoretical basis, the effects of certain kinds of action?

Why is there such widespread adoption of certain systems, to the exclusion of almost all others? Is it because the newest is the best? Could it be that when a famous college or professional coach is successful with a particular system, others rush to its adoption simply because he is successful with it? Are such innovations studied carefully with respect to the ability, size, or maturity of the players who are expected to execute them?

The coach who is a true professional fully understands the capabilities and limitations of his players and *creates* or *adopts* a system to fit these criteria. In order to create something new he must, of course, have some understanding of mechanisms, psychology, and even human anatomy and physiology. (Effective blocking technique, for example, is dependent upon factors in each of these categories.) Of course, the mere *possession* of a storehouse of knowledge is not enough. The ability to *use* this knowledge in unique ways is essential if one is to be a true professional in any career. Creativity and the ability to think critically are indispensable assets.

The question now becomes, should physical educators, health educators, and recreation leaders be expected to function primarily as technicians or primarily as professionals? Is there room for both? If so, how does one decide which to become? And if one decides to become an excellent technician (as a teacher of skills, for example) what assurance does he have that after a few years he will not wish to move into a position requiring the background and training of the professional?

Some schools have attempted to solve this problem by training at least all majors as potential professionals. Other schools have been content to concentrate on techniques and skills, assuming that most teachers and leaders will be functioning at the technical level.

Other professions have recognized a need to provide separate training programs for technicians and professionals. Medicine, for example, has the curriculum for the M.D. as well as the medical technician. Each is thoroughly trained in his field, but there is no expectation that the technician will ever be interested in assuming the responsibilities of the "professional." At the same time it is also assumed that the technician will be highly proficient through excellent training and diligent practice of his particular specialty. In other words, the assumption is that the jobs of the physician and the medical technician are *different*, requiring dif-

FIGURE 1.3 Examples of the "bandwagon" effect of certain attributes that often seem to gain uncritical approval because "everybody's doing it": (A) health movies, (B) jogging, (C) isometric exercise, (D) steam bathing.

ferent kinds of people. Neither job can be adequately performed without the conscientious dedication of the person involved. Although the physician's training requires greater depth and diversity of study (and therefore more time), that of the medical technician requires mastery of intricate procedures and techniques, many of which require constant practice for the maintenance of proficiency. In many cases these are techniques that physicians are never taught. They must rely on the skill and know-how of the technician to supply them with reliable information on the patient. It is obvious that an incorrect diagnosis due to either faulty judgment or unreliable information could be disastrous to the patient.

Thus, medicine has learned to handle many of its rapidly growing problems by a division of labor. A relatively few people are educated in the theoretical "whys and wherefores" requiring ex-


(C)


(D)

tensive background upon which understanding and judgment can be built. A great many people are recruited for training in the important, time-consuming laboratory tasks required in today's medical practice. The physician, with his theoretical knowledge, can then decide what procedures are necessary and can direct certain treatments that are then carried out by those who are primarily trained in the intricacies of the techniques involved.

There are signs that public education is following the lead of medicine. The preparation of the subject-matter *specialist* is being advocated; such specialists would act as "master teachers" and would determine what is to be taught and the sequence in which educational experiences would appear. The responsibility for determining what the "patient" needs and in what doses the prescription is to be administered would belong to the master teacher.

He would be the planner and coordinator. Teachers with less background but with very specialized training would complete the team. These team teachers would then be responsible for implementing the courses; that is, they would do the actual teaching.

This pattern, or modifications based on the team teaching principle, has been proposed for physical education and health education as well. The problem of what training the master teachers should have as compared with that required of the other team members has not been solved.

It is at this point that the medical analogy breaks down. In medicine the professional, with his mastery of physiological and pathological considerations, has been carrying the load for years. It is only recently that the technician has come onto the scene to aid him in doing a better job for society.

In physical education the *reverse* is true. For many years the vast majority of physical educators have been trained as technicians. They have been trained in the physical performance of skills and in techniques of teaching others how to perform the skills. But where is the professional who can provide the "diagnosis" of what skills students need and at what age and in what sequence? Where is the professional who can state, with authority based upon unimpeachable fact or logic, which of the benefits claimed for physical education are fact and which are myths or old wives' tales?

Only very recently have our universities turned their attention to the preparation of experts in study of human movement in all of its specialized ramifications. Only recently have programs sprung up for the education of specialists in the fields of exercise physiology, community health problems, consumer health, recreation and aging, psychology of motor learning, sociology of physical activity, recreation for the handicapped, philosophy of physical education, and other related subjects.

The rapid development of the attitude that we need to have experts to study and understand the "whys" of physical activity has caused considerable controversy within the profession. There has not been universal agreement as to exactly what the major objectives of physical education should be.

## SUMMARY

It is important for the student in health or physical education or recreation to closely analyze his motives for choosing his prospective profession. While curiosity about or *personal* interest in a subject may be sufficient reason for embarking upon some careers (astronomy, engineering, computer programming, automobile racing, and so on), success as an *educator* must be based upon an interest in people, not as objects to be studied or used, but as human beings to be helped. Such a focus of interest demands no less scholarship, however, than a more selfish approach. But it does modify the uses to which scholarly knowledge is applied.

While the three fields of physical education, health education, and recreation are distinct entities, they do have

*ally and socially fit citizens through the medium of physical activities which have been selected with a view to realizing these outcomes (79, p. 40).*

Eight years later Bucher's definition had not changed substantially, but several pages were devoted to the development of an appropriate understanding of education in general.

*. . . when you add the word* physical *to* education *you are referring to the process of education that goes on when activities that develop and maintain the human body are concerned (80, p. 17).*

Such views differ little from that presented by Hetherington over fifty years ago. He defined *education* as a lifelong process in which the individual's powers were developed "and adjusted to a social order for complete living." He equated physical education with fundamental education and suggested that it provided the basis for all the rest of education (176, p. 115).

In 1910 T. D. Wood and Clark Hetherington began writing about "the new physical education" as a broadening experience in the lives of students. Wood concluded that "physical education should occupy itself with a program of activities which would foster physical health, but they should be considered as by-products while the pupil was being guided toward the acquisition of mental, moral, or social benefits" (176, p. 115).

Despite some widespread insistence upon narrowing the objectives of physical education to those of "preparedness" during and following World War I, the focus of physical education during the first half of the twentieth century was on the broad contributions that could be made to the development of good citizenship. As wartime emergencies and cold-war pressures persisted, the fitness objective periodically waxed and waned in prominence, but "there is little doubt that the idea of physical education as a contribution to 'education for complete living' has been the dominant theme of the field since the early years of the twentieth century" (176, p. 122). Physical education proclaimed its value in terms of the contributions it could make to the "total education" of the individual "through the physical." As a specific medium of education, it could (and did) claim widely diversified objectives accumulated from the procession of educational theories that have influenced education since 1900.

One of the great difficulties encountered in trying to state the nature of the profession lies in the nature of the term *physical education* itself. One of the great early spokesmen for physical education, Jay B. Nash, has said that the word *physical* is a misnomer because it implies that there is some sort of inherent conflict between physical and mental activity (418). The idea of "educating the physical" has long been dismissed because it is self-contradictory. Still persisting, however, is much of the original confusion that has always accompanied the use of this term. Nearly thirty-five years after Nash's time, despite suggestions by many leaders that the name of the profession be changed to reduce confusion,

the old problem is still with us. In 1967 Janet Felshin wrote: "The name itself is unfortunate, of course, because it explains nothing. We know—unless we wish to deny overwhelming evidence to the contrary and claim a dualism of mind and body—that the 'physical' cannot be educated, and even if it could be, as programs of physical education have long seemed to suppose, what would such an education mean?" Felshin goes on to point out that a true discipline must be defined in terms of its unique subject matter.

*Physical education has been explained not as the "study of . . ." but as the "teaching of . . . ," which has resulted in the paradox of an academic discipline in colleges that is defined by curriculum in schools (176, p. 140).*

No one would seriously suggest that by merely changing the name of our profession could any of these problems be solved. On the contrary, the changing of the name would merely be a reflection of the changes in the concepts of physical education that are presently occurring.

If we are to survive as an effective, contributing, educational agency, we must accept the obligation to become experts in the unique subject matter of our profession: *human physical activity* in all of its ramifications and implications. The current emphasis is on determining logical boundaries for the discipline. Although agreement has not yet been reached on details, it seems evident that our profession is moving rapidly toward defining its overall concern in terms of "man in motion." Thus, the study of man as a *moving* being becomes the focus of the profession, and all aspects of human movement become the unique domain of its members. The physiological effects of physical activity (or lack of it), the sociologicial implications of sports and games, the mechanical efficiency of motor skills, the psychological effects of participation, as well as the esthetic aspects of movement as represented by the dance (but not limited to dance) would all be legitimate parts of the discipline. Study would be devoted not only to the effects of movement (or exercise) on the life and welfare of the individual but also to the effects that the various forms of movement activity have on his surroundings and his culture.

It should be evident that in this system the educational aspects of human movement (including the preparation of teachers, skill instruction, and coaching) would be only a part of the profession's concern. Study of the movement-related phenomena for their own sake, regardless of any practical applications, would be a legitimate pursuit of scholars. Conceivably, some people would find positions in industry, the arts, government, and other environments on the basis of their expertise in exercise or movement.

## NATURE OF HEALTH EDUCATION

The term *health education*, in contrast to *physical education*, enjoys much greater universality of definition. The term *health* is itself more broadly conceived now than formerly. Instead of the old

negative concept of "freedom from disease and infirmity," it now carries a positive connotation: good health is a "state of complete physical, mental and social well-being" (500). Thus *health education* is defined as "the process of providing learning experiences which favorably influence understandings, attitudes and conduct in regard to individual and community health" (410, p. 7).

Health education is typically viewed as part of a more diverse school health program that also includes health services to pupils and a program of healthful school living. In small schools, especially elementary schools, there is usually no health education specialist, and all three phases of school health are distributed among the teachers and administrators. There is usually no school nurse, and health appraisal is limited to yearly hearing and vision testing by a visiting school nurse or some other trained person. Larger schools, especially high schools, are more likely to provide a resident school nurse who is responsible for most of the services such as referral, caring for sickness and injury while at school, appraisal, and so on. Such a specialist is also usually responsible for evaluating and upgrading healthful school living, often in cooperation with the health educator. Apparently, more large secondary schools are providing full-time health education teachers, even though a recent survey shows that there are still few health teachers who are strictly full-time; only about 7 percent of all health teachers for grades 9 through 12 are full-time in health education (500).

Although, in one recent study, over 50 percent of all "large" schools sampled in grades 9 through 12 offered a separate health education class, only 25 percent required health education for all grades 9 through 12. These percentages are slightly different for medium-sized and small schools. Interestingly enough, more medium-sized school systems required health instruction (37.5 percent) than did large schools, and small schools were very similar to large ones in this respect (24.9 percent) (500). All too often the health educator's "other" responsibility is coaching. Experience has shown that this is often not the best combination of responsibilities, and it is usually the health education that has suffered. The professional health associations are concertedly attempting to change this situation. There is little question that well-trained, full-time health educators are needed to carry out most effectively the objectives of the new health education.

Health education cannot be handled by a technician. It is multidisciplinary in nature. Its content is "derived from medicine, public health, and the physical, biological and social sciences" (500). It covers diverse areas from the nature of disease to marriage and parenthood. Modern health education methodology draws from the behavioral sciences. The nature of today's health education is such that programs must be implemented and conducted by well-trained professionals, not part-time or, for that matter, full-time teachers who are trained only as technicians (see pages 12–16).

In summary, health education is:

1. Multidisciplinary in nature
2. Dynamic (growing and improving) in nature

## THE NATURE OF RECREATION

"The most dangerous threat hanging over American society is the threat of leisure . . . " (161, p. 390). "The darkest threat to the well-being of the working man and the subject of increasing concern on the part of organized labor" is the burden of leisure (161, p. 390).

These grim statements from responsible leaders leave little doubt about the urgency of preparing Americans to cope with leisure. The problem of leisure in American life is intimately bound up with our consideration of recreation. This is not to imply that leisure and recreation are the same thing but to imply that it is difficult to consider recreation in any setting that does not involve leisure.

### DEFINITIONS

There is no universal agreement about the definition of leisure. It has been claimed that no real definition can be given. One of the problems is that the term is used to describe a block of available time, a feeling about obligations or lack of them, a tool for social control, an opportunity for self-improvement, or as a part of a work-rest dichotomy. It has been stated that the term should really be a verb, "to leisure," implying that some kind of a conscious process is going on (4).

The traditional definitions of leisure regard it as a block of time. This time is distinct from that spent in work or preparing for work. Even this concept, however, has its problems.

> *Work is something to fulfill yourself with. Work is something you love to do, not something you do with your eye on the timeclock. . . . A job is different. We have replaced the concept of work with the concept of the job. A job is something we give as little of ourselves to as possible and try to get as much for as we can, and try to get away from as soon as we can. . . . I don't use the term "leisure." I use the term "work" as I'm going to use the correlative term "play." It is work in the old sense which we need to recapture, work that gives us buoyancy and a feeling of expressiveness, work which we may do while we're making a living, but also that we may do off the job while we're making a life . . . .*
>
> *I suggest that there is something very different from fun. There is play . . . Play is something which is totally expressive but doesn't end in a product. It doesn't have to end in a product. It is a thing in itself, worthwhile in itself"* (335).

Another has made the distinction between work and play in other terms:

> *Work is the main course, the meat and the substance of our lives. Recreation is the dessert; we like it best in modest portions at the end of a good meal. When we try to substitute the dessert for the meal itself, we lose our taste for it* (72, p. 23).

Kelso and Adler stated the relationships among work, leisure, and play this way:

*Play, like sleep, washes away the fatigues and tensions that result from the service occupations of life, all the forms of labor which produce the goods of subsistence and all the leisure activities which produce the goods of civilization. Play and sleep, as Aristotle pointed out, are for the sake of these services and socially useful occupations. Since the activities of leisure can be as exacting and tiring as the activities of toil, some form of relaxation, whether sleep or play or both, is required by those who work productively (300, p. 17).*

Brightbill has defined "play" as "the free, happy, and natural expression of animals—especially the human animal . . . When we refer to adult activity," he continues, "play might more fittingly be called *recreation*" (72, p. 30).

It is clear that when we refer to recreation we are not indicating any particular activity or class of activities. That which is work for one can easily be regarded as recreation by another. There is another important distinction to be made with regard to this term. Whereas recreation up to this point has been discussed in its general connotations, we are particularly interested in it as an organized service profession. Perhaps the term Recreation Education, or Recreation Leadership would be more appropriate in this context. In any event, we will need to look at both the general nature of recreation, its history and cultural implications, as well as at the systematized structure that has been created to deal with the leisure time activities of human beings.

# PROFESSIONAL OBJECTIVES

## OBJECTIVES OF PHYSICAL EDUCATION

It has been mentioned that regardless of the philosophical winds that have blown through physical education over the years, certain objectives have consistently retained a prominent place in the overall aims of the profession. Two of these are, of course, health and physical fitness. Because these particular objectives have persisted, it must not be assumed that they are universally accepted as being the most important objectives. Because disagreement about the relative importance of particular objectives is inevitable, it is impossible to make any list of primary and secondary objectives that will be satisfactory to the entire profession.

On the other hand, it is possible to group most of the commonly held objectives into a few descriptive categories. This has been done in a great variety of ways, some more detailed than others.

*Organic development* is generally considered to be of importance. This would include, among other things, the maintenance of health through good health practices and the development of physical fitness including sufficient strength, circulo-respiratory and muscular endurance to avoid excessive fatigue and to insure adequate energy levels. Although the development of sports and recreational skills is usually covered under a separate heading of *neuromuscular development,* it too could be considered one of the organic objectives.

*Social development* is another objective that is universally listed. The ability to function effectively with others and in groups is usually considered an important outcome to be sought through physical education. The emotional control that may be learned as a part of participation in games and contests is considered important. The acquisition of the qualities of cooperation, leadership, and related factors is also valued.

Closely related to social development is the objective of *psychological development*. Subsumed under this heading would be such things as improved personality characteristics, self-confidence, self-respect, and opportunity for self-fulfillment and self-realization. Frequently included in this category are claims that physical education contributes to the generalized learning abilities of the child. A few schools have deliberately designed their curricula with this objective uppermost in their thinking.

The *cognitive objective* (sometimes called *intellectual development*) is that traditionally stressed by teachers of "academic" subjects. Although health educators have long been concerned with helping students gain understanding of certain facts and principles, physical educators have generally limited their cognitive emphasis to knowledge of rules and strategy of sports and games. It is apparent, however, that the cognitive objective has assumed a role of major importance in recent years. Much of this book is devoted to the subject matter of physical education in the belief that the knowledge of such information is important to the welfare of professional and layman alike.

An objective that is seldom discussed is that of *philosophical development*. The great difficulty in dealing effectively with the teaching and evaluation of ethics and values is apparent. It has become increasingly apparent, however, that society is in urgent need of coming to grips with the problem of values in today's world. The question of whether sports and physical education effectively shape desirable value systems is one that must come under increasingly close scrutiny. The quality of the professional leadership available is obviously crucial to the attainment of any objective; it is of particular importance in the case of realizing philosophical objectives.

## CURRENT PRACTICE IN PHYSICAL EDUCATION

Which objectives are being stressed in physical education today? Of course, if one looks hard enough almost anything can be found somewhere. On the other hand, it is frequently possible to identify trends or patterns as they emerge in response to changing circumstances over a period of time.

After World War II, and especially since the late 1950s, the physical fitness status of American youngsters has certainly received a great deal of attention. Similarly, it is apparent that interscholastic athletics (beginning even at the elementary school level in some cases) are enjoying unprecedented popularity. On the basis of these informal


**FIGURE 2.1** Physical education has taken many different forms. Widely differing emphases can be found, as illustrated: (A) modern dance, (B) sports skills, (C) physiological effects of exercise, (D) gymnastics.

living and well-being and to concentrate on the most valuable of these. This would mean that even though society may value very highly the ability of its citizens to get along with one another peaceably, physical education would not make these its major aims because many other aspects of the school program (drama, music, school government, and classroom and committee assignments) contribute to the social objectives. It would, of course, cooperate in making efforts wherever it could to reinforce desirable behavior in this regard.

Illustrations of the things that might be seen as being unique to physical education would be concerns such as physical fitness, sports skills, exercise techniques, and intellectual awareness of the physiological and psychological effects of exercise and sports participation. It should be noted that these are only examples and should not be interpreted as being an exhaustive list of the unique concerns of physical education. The only criterion required for determining whether a given objective should be placed on the list would be that of unique and ultimate responsibility. That is, if a given individual appears to have failed in the attainment of certain objectives, *to whom can he be referred for remedial action?* If, for example, a student seems continually depressed and uncommunicative despite all efforts of the instructor, he should be referred to the school psychologist. On the other hand, where does the instructor send the youngster who is chronically low on the physical fitness scale? The fact is that there is no one (including physicians, physiologists, and therapists) who have the training and background in this area that the physical educator is expected to have. Therefore, physical fitness is classified as one of the unique objectives. The only question remaining is whether it is a sufficiently important objective to be given priority. This decision must be made on the basis of philosophical considerations.

From the preceding discussion it should be clear that if one views physical education primarily as a tool to be used in achieving overall educational goals, then its primary objectives will change whenever changes in society's educational emphasis occur. Under such conditions physical education is a process or procedure, not a discipline, and cannot logically have any objectives of its own. If, however, physical educational emphasis occur. Under such conditions physical education is ber of legitimate objectives can be established *independent* of the goals of general education. Because such goals would be oriented to the preservation of the efficiency of movement (that is, the prevention of degenerative disease, the acquisition of desirable body image, the development of certain kinesthetic appreciations, and so on), they would generally be in harmony with the aims of general education. In many cases the realization of the goals of physical education (particularly those related to physical and mental health) would be prerequisite to the pursuit of many of the socially and/or politically determined goals of general education.

Up until the present, however, it is evident that physical education has been viewed pretty much as a tool of general education in the achievement of broad, cultural goals. As a result there have been a great many changes in the emphasis of physical education both in this country and abroad.

### Opportunities in Physical Education

Physical education is an extremely broad profession frequently merging into health education programs or recreation programs. Because the programs he is equipped to direct and the objectives he is dedicated to pursuing are utilized by different organizations in a variety of settings, the competent, *well prepared* physical educator will discover that he has a choice of many professional opportunities.

The various divisions of the school structure offer a great many opportunities to the prospective professional. Physical education teachers are needed at elementary, junior high, senior high, junior college, and college levels. Elementary specialists are in increasing demand, including both men and women. Some of the most challenging and exciting work in physical education is now being conducted at the elementary school level.

The junior and senior high schools continue to provide the bulk of positions. With burgeoning populations and new construction everywhere, positions are more numerous than ever before. It should be carefully noted, however, that in some areas of the country there are more male physical educators graduated than there are positions, particularly at the secondary level. Keep in mind, however, that there is always a demand for the *good*, well prepared physical educator. This concept, involving a clearcut distinction between positions in coaching and physical education, will be amplified later. Of course positions for women at the secondary level are always available, many of them remaining unfilled for lack of applicants.

At the college level there are several kinds of professional opportunity. One of these involves teachers of skills and games. Traditional college programs usually provide opportunities for students to enroll in classes in which they can improve or maintain physical fitness levels and learn skills that will be useful to them in their post-college years. Most colleges require at least a master's degree of all teachers, and many require higher degrees.

In recent years there has been considerable interest in revising college required physical education programs to place more emphasis on the *understanding* of how physical activity, sport, and play contribute to the health and well-being of the individual. Such programs are designed to add a dimension to traditional skill and fitness-oriented programs and should not be interpreted as a substitution of intellectual activity for physical activity. Teachers in this kind of program require greater depth of training than is usually available in the master's degree curriculum. Most schools employ team teaching techniques in conducting the various aspects of such programs.

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Of course the training of future teachers of physical education requires large numbers of competent professors. Such positions almost always require a doctoral degree as well as teaching experience at other levels. In addition to professional teaching opportunities, many universities now have research specialists who have only limited teaching responsibilities and spend most of their time in research endeavors.

Other positions for which graduate work is required include administrative or supervisory positions at all levels of physical education. While coaching responsibilities are not generally regarded as requiring advanced graduate study, many colleges do not hire people for coaching responsibilities alone, and in such cases advanced degrees are mandatory.

Opportunities existing outside the schools cannot all be listed. Some of those most commonly pursued by physical educators are found in organizations such as the YMCA, YWCA, YMHA, community centers, and municipal or private clubs. Boys' clubs, hospitals, churches, industrial concerns and other agencies also frequently employ physical education specialists.

It is becoming clear that this is an age of specialization. While a broad background is always necessary for effective professional accomplishment, today's problems require an expertise that cannot be attained without specialized study. This means not only better undergraduate theoretical and technical preparation but also advanced study. Specialists are commonly employed for positions in dance, acquatics, elementary physical education and gymnastics in the public schools. At the college level specialization is even more narrow. The person who plans to make the most of his potential must strive to secure the best possible undergraduate preparation upon which to select and build a future specialty.

## OBJECTIVES OF HEALTH EDUCATION

In terms of the establishment of general objectives, health educators have (at least in recent years) achieved greater unanimity than have physical educators. Since "health" has been defined in rather specific terms, it has been relatively simple to devise objectives for the educator to pursue.

It must be emphasized, however, that the field of health education is so broad (encompassing everything from sex education to the problem of metabolic disturbance resulting from rapid time zone change in east-west air travel) that it is essential that priorities be established on the basis of importance. Since there is always basis for disagreement on relative importance of specific objectives, there is still considerable disparity among health education programs throughout the country.

Many problems have been encountered in dealing with controversial topics such as sex education, birth control, drug abuse, alcoholism, fluoridation, and smoking. It is virtually impossible to separate social issues and value judgments from such issues, yet health educators are frequently forbidden to utilize any methods other than an objective approach (if indeed,

profession comes immediately to mind, but many of the other possibilities for service in this important area are not so apparent to the student beginning his college studies. Medical sociology, physical therapy, sanitation engineering, public health nursing, hospital administration, medical technology, biostatistics, and dental hygiene are just a few examples of many health-related career opportunities. These, of course, require preparation of varying kinds and amounts not usually a part of the programs in university departments of health, physical education, and recreation. The careers for which you can prepare in such departments are more likely to directly involve education. There is a need for more well prepared health educators, public and school. The school health educator is concerned primarily with planning and conducting educational programs within the public school organization, though he certainly can promote public health education as well. Most persons trained in health education have naturally gravitated in the direction of public school teaching positions. But public health departments and agencies are more and more becoming interested in utilizing the full-time services of public health educators. They also recognize the need for more in-depth preparation of such persons, especially with regard to the scientific bases of health.

The health educator with a baccalaureate degree may also continue his professional preparation by studying for a master's degree. Those with the interest, background, and intellectual capacity can achieve a doctorate, specializing either in health-related research or in health education or both. Such professionals most often choose to affiliate themselves with colleges or universities, but there are other agencies and institutions in need of these professionals as well.

The need is apparent and the opportunities for service in the health-related professions are both great and varied.

## OBJECTIVES OF RECREATION

Like the objectives of physical education and health education, the objectives of recreation have undergone change over the years. The goals sought by each teacher will, of course, vary depending upon the people and problems with which he works.

The Commission on Goals for American Recreation has produced a statement encompassing six objectives (119).

1. Personal fulfillment. In emphasizing the importance of the individual in our society, recreation is viewed as having one outstanding purpose: to enrich the lives of people. "One approaches personal fulfillment as he narrows the gap between his potentialities and his accomplishments." The recreation leader's challenge is to provide experiences "through which the individual may enjoy success in his search for adequacy or self-esteem."
2. Democratic human relations. Since exclusive concentration on personal goals may lead to the development of

selfish, noncooperative individuals, other goals relating to ethical behavior and social responsibility are important. Leaders are urged to be alert for opportunities to cultivate "respect for human beings and concern for their welfare."

3. Leisure skills and interests. People engage in activities that they perform well. Development of a high degree of skill is regarded as the best means of insuring interest and participation in a given activity. Enlarging the scope of people's interests is regarded as contributing to a more rewarding life.

4. Health and fitness. Vigorous muscular exercise is regarded as an essential factor in the maintenance of the healthy, vigorous organism. Because contemporary society has so drastically reduced man's opportunities for vigorous activity, it is regarded as essential that recreation programs include and encourage involvement in vigorous physical activity.

5. Creative expression and esthetic appreciation. Emphasis on opportunities for personal expression and creative experiences is important as an antidote for some of the negative effects of an increasingly materialistic society. With increased leisure for all people creative participation in life is seen as assuming unprecedented importance.

6. Environment for living in a leisure society. Recreation seeks to counteract some of the effects of the destruction of our natural resources by providing facilities and experiences that will bring people into contact with nature. Participation in and enjoyment of music and drama as well as other artistic and esthetic endeavors is another goal which is sought by recreation leaders as they work to add meaning and enrichment to the lives of people.

It is apparent that to select any one objective as being more important than others is difficult because they are closely interrelated. There are certain aspects of each, however, that are of common interest to health and physical educators as well as recreation people. Because of these common objectives it is possible for training in certain professional subjects to benefit individuals preparing for each of these professions.

If the recreation person is to be interested in the fitness of those with whom he works, he must have a basic understanding of fitness, what it is, how it is maintained, and what its limitations are. The same is true for motor development and the teaching of motor skills.

Psychological principles are particularly important. Because there is no real coercive element in recreation programs, programs will be engaged in solely on the basis of their appeal or the appeal of the recreation personnel. An understanding of human behavior can spell the difference between success and failure.

Although the public does not really understand what a university recreation course consists of, the prospective recreational specialist should. Obviously, it is not necessary to have four years of college training in order to teach a class in crafts or square dance. Nor is such training necessary for success in leading sports programs and running tournaments. If recreation programs are

to achieve more than simply "keeping the kids off the street," however, preparation of leaders who understand the problems and know the principles involved in developing solutions requires *at least* four years of college level preparation.

## Opportunities in Recreation

Recreational opportunities, as one would expect, have expanded enormously in the past twenty years. Because so many kinds of programs are provided in communities, people with widely divergent interests may find employment in one of them.

Some of the institutions and agencies with organized recreation programs and recreation personnel are:

1. Federal, state, city, and local governmental divisions. This includes parks, schools, conservation departments, military establishments, forestry service, and welfare agencies. Federal grants are currently providing a number of extensive recreation programs.
2. Private agencies. Well-known agencies such as the YMCA, YWCA, YMHA, church-sponsored community centers, Boy Scouts, Girl Scouts, and Campfire Girls continue to require large numbers of qualified leaders. Other organizations such as private clubs, camps, and charitable organizations require leaders with training to operate camps and organize community projects.
3. Commercial agencies. Many commercial enterprises hire specialists in the organization and teaching of recreational activities. Summer resorts, bowling alleys, theaters, food specialty chains, and manufacturers of sporting goods are some of the kinds of agencies interested in recreation.
4. Industrial plants. Industrial plants have moved into the area of recreation with large programs. Frequently programs are sponsored throughout the year for the entire family of the employee. With the recognition of the fact that private industry must take a large share of responsibility for the provision of things that will assist less affluent members of our society to achieve their potential, more emphasis is likely to be placed on programs such as these.
5. School programs. It has long been evident that schools in city and suburban areas needed to become centers for more kinds of community activity. Taxpayers are beginning to insist that the vast funds expended in school construction return greater dividends in terms of more use. This means that recreation programs, not just for children but for all segments of the community, are being established in school facilities. Although school personnel may occasionally be involved in such endeavors, the programs themselves are frequently separate from the school operation, and personnel are not school teachers putting in extra hours. Such "lighted schoolhouse" programs can aid in solving the fundamental problems of providing the necessary funds to meet the needs of the community.

## Effectiveness of Recreation Programs

The evaluation of the effectiveness of recreation programs in terms of the established objectives is exceedingly

difficult. Because other factors also bear on those that the recreation professional is interested in, it is difficult to conclude just which factors produce what effects.

The new governmental programs mentioned previously, for example, utilize a great many techniques in attempting to get potentially capable youngsters prepared for college. Recreation is only one of these techniques. It is difficult to evaluate reports claiming success in teaching Spanish or geometry in Head Start programs by the incorporation of recreation techniques. Another problem is that when we begin talking about the use of recreational techniques in teaching or in obtaining some desired behavior, are we still talking about recreation? Some people feel that we are not.

It is easier to assess the effects of leadership on the kinds of programs produced and the number who participate. These kinds of research have considerable usefulness in establishing the need for capable recreation leaders. For example, a report by Chandler and Hyde (98) indicated that in an institution for elderly people, the social interaction and participation of socializing activities were dependent upon the presence of a recreation leader. His absence resulted in a 50 percent reduction in socializing behavior.

Other studies relating to health, physical fitness, social, and psychological characteristics have been reported in other sections of this book. Many of these could be regarded as being pertinent to recreation because of the kinds of activities involved.

There remains a great deal to be learned about the overall effects that recreation programs can have on our complex, confusing culture. Can the depersonalizing effects of the computer age be forstalled? Can concern and compassion be a part of a mechanized, sophisticated (sometimes cynical) society? These are only examples of the important questions that need answers.

*Play is more than a pastime, it is a fundamental tool for the discovery and rediscovery of the meaning of living. An understanding of the relationship between play and the development and fulfillment of the self is a prerequisite for effective programing. The creation of recreation theory rests upon this cornerstone (506, p. 50).*

## SUMMARY

Definitions of physical education vary significantly and are usually phrased in terms of what physical educators *do* rather than what they study. Part of the difficulty in coming to substantial agreement on primary objectives for physical education may stem from lack of agreement about what physical education really is. It has been suggested that the study of human physical activity, with all its implications, should define the limits of physical education.

Health education has had few problems of definition, but "health" as a concept has undergone considerable expansion in recent years. While separate classes in health education are found in most of the larger schools, full-time health educators are still the exception rather than the rule.

Recreation, as a career, defies precise definition, much as physical education does. Its operation is closely associated with man's leisure but is certainly not synonymous with it. The concepts of work, play, and recreation are complexly intertwined making the tasks of recreation leaders exceedingly important, as well as difficult.

Although it is not currently possible to get physical educators to agree on the *primary* objectives of physical education, the major objectives most often articulated can be placed into general categories such as: (1) organic development, (2) social development, (3) psychological development, (4) development of cognition, (5) philosophical development. The objectives most commonly stressed have fluctuated with social conditions and shifts in educational philosophy. It is suggested that the objectives most commonly pursued with greatest vigor are not necessarily the objectives of greatest importance to the welfare of the student.

Criteria for the establishment of objectives are based on philosophical considerations. The wide variety of objectives is understandable in the light of differences in philosophy within the profession. One way to simplify the problem of selection of primary objectives would be to make selections on the basis of the *uniqueness* of contributions of physical education to individuals. One problem is that this procedure ignores the establishment of priorities in terms of the relative *importance* of all possible objectives. That is, if uniqueness *alone* were used as a criterion, the matter of whether a given objective has any relevance to the needs of individuals would not even be considered. Selection of only the unique, *important* objectives again involves philosophical considerations and may narrow the scope of professional concern excessively.

The broad, basic objectives of health education have been well articulated and are widely accepted. Other problems have been encountered, however, in the matter of controversial subject matter (such as drugs, sex education, and smoking) and in the matters of exactly which techniques should be used in the pursuit of desired objectives.

Objectives of professional recreation leaders have changed considerably in recent years as social problems have multiplied. Although *primary* objectives of recreation may differ substantially from those of health education or physical education, the tools and activities used in their achievment are nearly identical with those used in the other professions. Opportunities for employment in each of the three fields are greater today than ever before. The serious nature of the problems now being faced has, however, made the quality of professional preparation an extremely important factor in securing desirable positions.

## PRINCIPLES

1. If man is viewed as an entity (as opposed to the old dualistic concept of a mind and a body), the term "physical education" becomes entirely unwieldy as a name for a discipline.

2. The boundaries of a discipline cannot be adequately defined in terms of what its professional members do. Generally, it must be described in terms of "the study of . . ." rather than "the teaching of. . . ."
3. If an overall discipline can be defined as the study of human physical activity, physical education (the teaching of concepts, skills, and techniques), would logically become the educational arm of the discipline.
4. Health, as a concept, is more than mere absence of disease; it is a state of complete physical, mental, and social well-being.
5. Political and economic conditions have resulted in the possibility of mass leisure that looms simultaneously as a potential threat and a potential blessing.
6. The fact that a given professional objective has widespread approval and practical support does *not* necessarily mean that it is more important than other less popular objectives.
7. Two distinct approaches to the problem of determining objectives to be given priority can be identified. One is to determine the needs of the student and shape objectives to fit these needs; the other is to identify the potential *unique* contributions of the discipline and structure objectives around them.

## EXPERIMENTS AND EXPERIENCES

1. Create a check sheet listing as many "possible objectives" of physical education as the class can formulate. Each class member should then rank these objectives in the order that he *believes* most accurately reflects the objectives of high school physical education programs.
2. Survey the class and determine the percentage of students who have experienced formal, classroom instruction in health (apart from that incorporated into science courses).
3. Contact all available community recreation agencies and determine the number of events sponsored that have as their objective the improved health of their members.
4. Obtain a list of facilities available for recreation in your city. Estimate the maximum number of people that could be accommodated at any one time. What implications does this have for future programs of recreation?

## SUGGESTED READINGS

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# Development and Current Status of the Professions

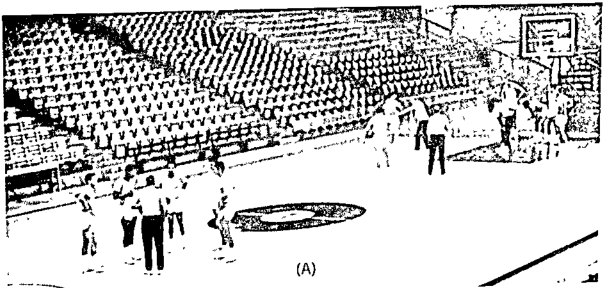
# Chapter 3

## STATUS OF PHYSICAL EDUCATION

In looking at the picture in the public schools today, it is easy to identify the major patterns followed by physical educators. Sports skills and physical fitness are obviously the two factors most commonly stressed. Furthermore, in many instances the fitness objective is applied to the great mass of students while the skills objective is vigorously pursued with only a relatively few talented performers, who are usually members of interscholastic teams. Although it is true that the skills of team and individual sports are used as the basis of the curriculum in most schools today, inadequate facilities, large classes, and other factors have resulted in programs providing very little individual evaluation and instruction for most students. On the other hand, great attention has been given to this type of instruction at the varsity level.

In very blunt terms this means that in too many schools physical education classes consist of large groups of students being turned loose in small gymnasiums to play some form of team game. Instruction is usually minimal or entirely absent.

Evaluation of student needs and progress is usually a matter of guesswork rather than objective measurement. On the other hand, varsity sports are given a great deal of attention, time, and money. The coach-player ratio is very low, and several assistants are usually available to aid the head coach.



(A)

(B)

**FIGURE 3.1** Even in the finest American school systems, the best conditions for skills instruction (as illustrated by student teacher ratio and adequacy of facilities) are provided for those who have the greatest ability. Pictured are. (A) varsity basketball players and coaches and (B) girls' physical education class and teacher.

## DEVELOPMENT OF PHYSICAL EDUCATION

As has already been pointed out, several factors in our recent history have combined to shape our present philosophies and practices in physical education, as well as health education and recreation. If you are typical of the student who is just entering one of these professions, you are more interested in considering the future than the past. For that reason a detailed discussion of the history of physical education will not be presented. But because it is helpful in many ways to understand some of the events that have led up to our present circumstances, a brief backward glance will be taken here.

Physical education as a part of the public school curriculum may well owe its existence to war. The physical survival of individuals, as well as societies, has historically depended upon the ability of men to defeat other men in physical combat. It is not surprising to find, in looking back over the years, that nations have always demanded increased fitness for their citizens whenever wars have threatened.

### PREHISTORY

If one is willing to interpret *physical education* in a very liberal way, it is possible to say that the instructions given by cave-dwelling fathers to their sons in techniques of stalking and killing game (as well as human enemies) constituted a kind of physical education. Indeed, survival depended upon swiftness of foot and strength of arm; survival of the fittest was the most fundamental of laws. Under such circumstances of daily crisis (or "war") there is no doubt that physical fitness was a state to be highly valued. Observations of this kind have only limited value, of course, because no one would suggest that there existed any kind of formalized program of education during this period.

The earliest known records of systemized instruction in exercise for purposes other than combat are those from early Egypt and surrounding regions. It is apparent that, for certain classes of people at least, skill was developed in activities such as swimming, wrestling, dancing, and gymnastics as early as 2000 B.C. Instruction in activities more directly related to combat, such as archery, riding, and boxing, was also common.

### EARLY CIVILIZATION

Although it is generally agreed that civilization developed earliest in the southern Mediterranean countries, it is also apparent that the Chinese produced a remarkable early culture. As the mystical religions of the east developed, less and less emphasis was placed on the care of the body. Because war was viewed more as a necessary evil than as a worthy pursuit of life, educational systems for the training of soldiers did not become as highly developed as in other countries. Ancient China did, however, produce a system of light exercises designed to prevent disease. This form of medical

gymnastics called *Cong Fu* combined stretching and breathing exercises and was usually performed in a sitting or kneeling position.

Examination of historical accounts of other ancient civilizations indicates that most activities that could conceivably be labeled "physical education" were generally connected either with religious rites (as with the dance) or with preparation for combat. From a recreational standpoint there have been games and pursuits such as hunting, fishing, and other activities practiced since antiquity. Some of the most ancient artifacts are toys that were used by children in their play. Ancient references to ball games of one kind or another can be found in both written accounts and art of the various periods.

## EARLY JEWISH INFLUENCE

One of the ancient cultures having most influence in the development of Western civilization was that of the Hebrew people. Whereas the great emphasis on education generally excluded anything that could really be called physical education, it is of great interest to note the fact that the religious laws provided for health practices that were far advanced over other civilizations of the time. Cleanliness in the preparation of foods, the cleansing of eating utensils, and the washing of wounds under running water anticipated many modern disease-prevention practices.

Although the ancient Hebrew people apparently had great respect for human strength and although they certainly recognized the need for training for warfare, their culture made little provision for sport or games. Whereas the influence of conquerors had, from time to time, caused Jewish communities to build stadiums or other sporting facilities, such influences were usually rejected when the domination of the conquerors ended. So, although we have derived many of our precepts about education and the responsibility of parents for the education of their children from the Hebrew tradition, little else that directly applies to physical education or modern recreational practices can be attributed to the ancient Jewish influence.

## THE GOLDEN AGE

On the other hand, one of the cultures having the greatest influence on modern practices in our profession was that of the early Greek civilization. One of the most obvious signs of this influence is that of the Olympic Games; this sporting festival originated in Greece about 776 B.C. as one of several such festivals held periodically. They achieved such importance that wars among various city-states came to a halt temporarily in order that the Olympics might be held every fourth year.

The idea of periodic international athletic competition is only one of many concepts that have been borrowed from the remarkable culture of the early Greeks. This period has been called the Golden Age because of the almost unbelievable contributions it made to the culture of man. Art, science, music, drama, philosophy, education,

commerce, agriculture, and practically every other endeavor of man received a tremendous acceleration during this period. In short, this was the birth of Western civilization.

Most of the information we have about the ancient Greeks has come to us through such accounts of life as were recorded by Homer in the *Iliad* and the *Odyssey*. Through the accounts of such heroes as Achilles and Odysseus we learn not only of the ideals valued by society but also of the educational aims and goals. The detailed accounts of the funeral games and the religious ceremonies give us a picture of a vigorous people who, even though they were in a position to make choices, apparently had no desire to lead a life of ease. We are also led to see the development of a society that placed the highest possible value on the harmonious development of all aspects of an individual's capabilities; action and wisdom were highly prized as characteristics to be equally developed. It is interesting to note that as the Greek culture evolved, it became taken for granted that every citizen had a responsibility to exercise daily in addition to other duties, including strenuous military training. The state provided gymnasiums for the use of all male citizens, and it was expected that even older men would make use of the facilities for their physical well-being. Of course, it must be remembered that cultural activities of other kinds also took place at the gymnasium, especially during the later period of that age.

It must not be assumed that aims and practices were uniform throughout ancient Greece or that these remained constant across the years. You will remember that Greece was composed of a group of city-states, each independent from the other. Athens and Sparta were two of the largest and most influential and are representative of differing attitudes toward the citizen's preparation to meet these responsibilities. Although a more detailed discussion of the philosophies involved will be found in Chapter 7, you will remember that, in general, Sparta stressed military preparedness and discipline whereas Athens was noted for its more democratic emphasis in securing the services of the individual for the state. There were other differences as well, but there were also some significant similarities.

One of the most interesting characteristics of the city-states was their belief in the involvement of citizens in the affairs of the state. This is exemplified not only in the training for fighting that was expected of every citizen but also in the fact that the citizens themselves were the participants in the games of the various festivals. Apparently nothing was more highly prized than to be the well-rounded man, a perfect balance between the man of action and the man of wisdom.

It has been said that one of the significant reasons for the great cultural accomplishments of this period was that unusual individual freedom of thought and action was coupled with individual responsibility for civic affairs. Similarly, it has been observed that this society passed its pinnacle when freedom led to individualism without a civic concern. When prestige



**FIGURE 3.2** Ancient Greece was remarkable for its equal emphasis on the perfection of physical and mental attributes. (A) Demosthenes, antique sculpture (Vatican Musuem, Rome, Alinari—Art Reference Bureau). (B) Myron's Discobolus, Roman copy after bronze original (National Museum, Rome).

became more easily obtainable through wealth and political power than through individual cultural and physical accomplishments, the strength of the city-states began to crumble. The vulnerability of Greece was further increased by the shift in concept from idealizing the man of balanced action and wisdom to idealizing the man of wisdom only.

If the story of physical education in Greece were nothing more than another example of how a young, vigorous nation rose to a position of prominence and then, through neglect of physical vitality, fell prey to another more vigorous culture, there would be little that is unique to study. In this case, however, physical activity, athletic performance, and the maintenance of physical fitness were regarded, for the first time, as something more than mere preparation for war or individual combat. There was a period at the height of the Greek civilization when education was thought to be complete only when a

man could perform as well as think. For a young man to exhibit a flabby body was to admit a deficiency in his education (see Chapter 7).

Furthermore, the esthetics of performance were highly valued. The appearance of the body was ideally to suggest a fine balance and harmony of development. The classical Greek statuary indicates the esteem in which grace and harmony were held, as opposed to muscular bulk for its own sake. It is also true that during this period the quality or appearance of the performance was regarded as highly as was the final outcome in terms of winning and losing.

With the decline in participation in games by the citizenry and the concommitant increase in professionalism, less and less emphasis was placed upon the *experience* of performing; the *outcome*, as well as the entertainment provided by the spectacle, became the important factors.

## ROMAN INFLUENCE

After the Greek civilization fell to the Macedonians, and later to the Roman Empire, much of the unique character of the Greek attitude toward physical education was lost. The Roman had no taste for the Greek tendency to involve himself in the games and contests of the many festivals. The Roman preferred to observe the giant free spectacles from the comfort of the grandstand. Furthermore, the Roman had become accustomed to the emotionally charged spectacles of bloody gladiatorial combat and brutal contests between animals as well as between men and animals. The relatively tame contests involving the throwing of the javelin or the discus had little attraction for him. And whereas he found some entertainment in observing the time honored wrestling and boxing contests of the Greeks, he found it necessary to brutalize even these. The wearing of nailed gloves and riveted fist wrappings became so popular that blows produced gory wounds and hideous permanent injury, if not death. It is little wonder that after years of observing "athletic" contests of this nature, founders of the early Christian church turned away from any consideration of physical activity or exercise as a worthwhile pursuit. The fact that many of the early Christians were slaves who might themselves be subjected to deadly mock wars or animal combat in the arena for the pleasure of the masses might well have encouraged them to emphasize the spiritual, otherworldly aspects of their religion.

Whatever the reasons, it is a fact that as the influence of Christianity grew, the legitimacy of sport and physical training declined. The glorification of the body came to be regarded as a sinful tendency to be resisted at all costs. It was during this period that the body and spirit were pictured as two separate entities constantly warring against each other. In order to elevate the spirit, and thereby come closer to God, people subjected themselves to all kinds of physical discomforts and tortures. Any suggestion during this period that man was a single organism and that the

well-being of the body could be a positive contribution to his spiritual condition would have been vigorously rejected.

As more and more attention was given to the staging of splendid entertainment and as vast sums of money were devoted to luxurious living, the economy of the Roman Empire began to collapse. Those who were wealthy tried to outdo each other in extravagance, while the peasants became progressively poorer and almost without influence in a land that had once prospered with the proud peasant-soldier as its backbone. The paid professional soldiers felt little civic pride or responsibility. Oratory, always prized by the Roman as being almost more desirable than wisdom itself, became a tool merely to sway the voters. Statesmanship disappeared into a welter of selfish, individual aims.

As the training of soldiers became a matter of preparing professionals, the military education of the general male citizenry became less and less necessary. Whereas the war-related activities such as riding, swimming, archery, and so on remained popular activities among the rich for some time, gradually a love of luxurious living replaced these things. The famous Roman Baths were extremely popular among both men and women. Here one could while away countless hours in the warmth and steam of these luxurious facilities. Strenuous activity held little attraction for people under these conditions.

With the decay of civic pride and economic responsibility came political vulnerability. Invaders from the north were successful in raids upon Roman communities. As the barbarian attacks increased, the beautiful cities were plundered and the population was scattered and killed. People were forced to seek shelter in castles or similar fortified communities, each an independent unit. Peasants worked the fields around the walled sanctuaries in exchange for the protection of the owner in times of danger.

of knowledge, to comprehend the period of nearly a thousand years of retrogression and stagnation as far as learning was concerned. Only a worldwide nuclear holocaust could approximate today the conditions prevailing at the depths of the terror-ridden Dark Ages. Under such circumstances survival is the only objective of any personal importance; cultural considerations are nonexistent.

## THE RENAISSANCE

About the tenth century, however, there were stirrings of interest in matters beyond the local level. The causes and implications of this beginning of the period known as the Renaissance cannot be discussed here, except to indicate that religion and the Church played an important part in this revival of culture. The simple fact that representatives of European areas began to venture once again into unknown lands created the conditions for exchange of knowledge, an aroused curiosity concerning other peoples, and a basis for at least a limited commerce among peoples. The crusades into the holy lands, as destructive and as poorly conceived as they often were, did contribute substantially to the rekindling of interest in learning and culture.

It was during this time that knighthood provided the only arena in which any physical education was practiced. The familiar stories of jousting and tournaments provide descriptions of the kinds of activities that young men of noble birth, at least, might hope to pursue. But it is clear that these activities were really no different than those practiced over a thousand years earlier. One significant difference, however, was the creed of chivalry that served over the years as a prominent factor in raising barbarianism to the level of civilization.

Despite the fact that the new enlightenment brought the development of universities and the congregation of young men who frequently engaged in games and sports of one kind or another, there was no official sanction or encouragement of such amusements. Gradually some of the private schools of southern Europe began to include some provision for exercise and recreation. In most others, however, such activities were either ignored or frowned upon by educators of the day.

This is not to say that there was not considerable interest in sporting activities during the Renaissance. Fencing masters were in great demand among the wealthier segments of society. Bowling on the green, tennis, and dancing, as well as other spectator amusements, were very popular. In an era when courtliness and good manners were stressed, many of these activities were considered indispensable means of promoting proper carriage and grace. All this was in addition to the time-honored practices of riding, wrestling, swimming, shooting, and other combat-related activities.

As the renewed interest in learning progressed, it was accompanied by a great social and political upheaval. Dis-

satisfaction with punitive economic practices spelled the collapse of feudalism, just as revolt against religious despotism resulted in far-reaching political and religious reforms. And although the Protestant reformation led to the creation of many denominations and sects, it did not produce greater religious tolerance. Conflict and persecution were responsible in a large measure for the establishment of colonies in the lands newly discovered by those who were seeking new trade routes. The hard work and privation required for survival in frontier settlements combined with religious doctrines (that tended to brand as sinful any form of recreation) to effectively prevent acceptance of physical education as a part of the school curriculum in the New World, as well as throughout much of the Old World. Social events were generally built around one of two legitimate activities: worship or work. Any activities that might be termed recreational needed to have some productive purpose such as that provided by quilting bees, house raising, or harvest contests. Even the natural playfulness of children was considered frivolous activity that must be curbed as early as possible.

## THE ENLIGHTENMENT

In the seventeenth century it was the rule rather than the exception to regard children as being little adults. In this kind of atmosphere it is not surprising that little thought was given to needs for physical education in the school programs of the day. There were those, however, who were strongly opposed to this philosophy. One of the best known of the so-called naturalists, who led the philosophical revolt against the practices in the eighteenth century, was Jean Jacques Rousseau. This noted French philosopher meticulously outlined an educational program that gave great emphasis to the development of physical stamina, strength, and coordination. The concept that it was a *human being* that was to be educated rather than a *mind* (as distinct from a body) was in direct opposition to the then current beliefs and practices.

Although Rousseau's ideas were tried in only a few private schools of his day, the ideas did not die. As cultural climates became more amenable to ideas of individualism, his concepts and others of similar direction came to be included in the design of curricula in various countries.

However, it was only through a long, complex series of social changes, including wars, political upheavals, philosophical and scientific advancement that physical education became an integral part of any educational system. As always, preparation for war continued to be one of the strong motivating forces for the inclusion of physical education in the school programs. This factor alone, however, seldom seemed sufficient for the justification of its inclusion. In most nations the increased awareness of the necessity for adequate exercise in the optimum development of children was an important consideration.

## EUROPEAN SYSTEMS

Germany and Sweden are the two countries that come to mind most readily whenever early programs of physical education in the schools are discussed. Out of Germany evolved gymnastics oriented to the use of so-called heavy apparatus such as parallel bars and vaulting horses. Friedrich Ludwig Jahn and, later, Adolph Speiss were responsible for development of much of the German System. Swedish gymnastics, largely attributed to Per Henrik Ling, were performed in conjunction with balance beams, stall bars, and other equipment of a "lighter" nature. Elaborate progressions and stipulations of proper form for the performance of exercises in both systems were painstakingly developed by their respective proponents.

At about this same period of the nineteenth century, the "public" schools of England were developing their own approach to physical education. These schools (which, despite their name, were maintained for the benefit of the aristocratic families only) stressed classical studies of language and literature as well as some science. In addition to these studies, the boys participated in a growing number of individual and team sports and games. Tennis, swimming, boxing, soccer, cricket, boating, and other activities became extremely popular at these institutions. Administrators of these schools encouraged this kind of participation not only for the physical fitness values they provided but also for the qualities of leadership, perseverence, and sportsmanship that they were believed to promote. It is noteworthy that despite efforts to popularize the formal European gymnastics programs in England, the populace never accepted them with the enthusiasm that they retained for their sports and games.

Today, as we look around the globe at the various systems of physical education as they are currently practiced, we can see clearly the influence of the three systems just discussed. The intensely competitive colonization not only expanded empires but also carried cultural influences, such as these favored systems of physical education, to many parts of the world.

Of course, the cultures into which systems were introduced determined whether they would be successful in meeting the needs and desires of the people of the culture involved. In America, for example, both the Swedish and German systems were introduced into the school systems at approximately the same time; both enjoyed some success. It is apparent today, however, that the predominant influence in American schools is that derived from the British society. It is clear that the nature of a people combines with prevailing economic and political conditions to produce educational practices. The United States has adopted a blend of the European systems to which it has added its own unique modifications. This is not to say that there is any such thing as a *national* curriculum in physical education. Surely many regional and local variations persist, both in regard to type of activity and quality of program. Generally speaking,

Courtesy Adidas

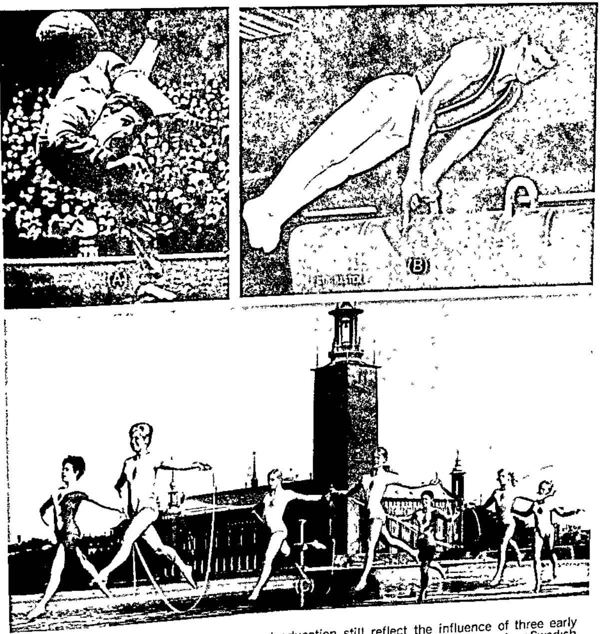



**FIGURE 3.3** Modern programs of physical education still reflect the influence of three early systems: (A) English, (B) German, and (C) Swedish, picturing the Sofia Girls, 1968, courtesy Swedish Information Service.

however, programs of physical education in this country are built around the sports-and-games concept. Criticisms regarding the alleged inadequacy of such programs for the building of adequate fitness levels have been met by the addition of more formal types of activity to existing programs, in most cases, rather than a change in emphasis and replacement by activities designed strictly for the development of physical fitness.

## TODAY'S PHYSICAL EDUCATION

If we discount the remarkable culture of the early Greeks, we can see that physical education is really a very recent development in man's history. When we stop to consider that the earliest systems of physical education were introduced into the schools only about 150 years ago (and less than 100 years ago in the United States), it is apparent that we are dealing with a very young aspect of education. When we then look at the changes that have occurred in the world within the last 100 years as compared with all that have gone before, it is not surprising that there are differences of opinion about what the main purpose of physical education should be in America and the world.

### THE FUTURE

There is little doubt that the next ten years will be critical ones for physical education in the United States. We will be facing problems that man has never before encountered. The role that physical education is to play in the lives of people will be determined by a great many factors, including social preferences, educational aims, economic goals and conditions, and political pressures. If our profession is to survive and emerge as a truly positive contributor to the welfare of mankind, physical educators themselves must become aware of:

1. The ways in which physical activity affects man and his environment
2. The ways in which man and his environment limit, encourage, and generally affect human physical activity

## CURRENT STATUS OF HEALTH EDUCATION

When we address ourselves to the question, "Where is health education today?" we naturally turn our thoughts to the questions: "Where were we?" and "How long has it been since we were there?" Investigation leads to two somewhat striking answers to the latter questions: "It was awfully dark and bleak where we were and it has been less than a hundred years since we were there." To put it another way, health education is "young," and it has grown and developed tremendously since its earliest beginnings about 1870, when it was nothing more than a temperance and antivice program with some anatomy, physiology, and hygiene thrown in for good measure.

### EARLY PRACTICES

Ancient societies, including the Chinese, Egyptians, Hebrews, Greeks, and Romans, including a period from about 3000 B.C. to A.D. 1700, were concerned to some extent about physical well-being and stressed certain rules for hygienic living. Emphasis was placed most commonly upon "physical" health and well-being and the absence of disease. Horace Mann, in 1840, stressed the importance of physical well-being and "educating for health," (188, p. 14)

but was largely ignored. The public health movement in the United States began in 1850. At that time city governments began to establish and upgrade health departments as a direct result of Lemuel Shattuck's *Report of the Sanitary Commission of Massachusetts* (188, 223). In this report, Shattuck described a modern program of public health—especially preventive programs—and gave impetus to the idea that health was more than absence of disease. Perhaps of even greater importance were his suggestions for *health education.*

Ohio instituted a state program in 1872; it was typical of those instituted from that time until about 1918 in that it was "anti-vice and function-of-the-body" oriented as a result of the powerful temperance-sponsored propaganda movement. Health as it is now conceived was not emphasized until sometime after World War II.

We can approximate the progress of health education from the early 1930s to the present by perusal of several typical health texts for college students. Williams' (609) fourth edition of *Personal Hygiene Applied,* for example, was published in 1931 and included several chapters on the meaning of health, the health problem, man in society, the approach to health knowledge, and science and attitudes, all apparently directed at setting the mood for effective learning. The remainder of the text was devoted to "the hygiene of" each of the major systems of the body and to nutrition, the mouth, eye and ear, and "sexual aspects of life." One chapter was devoted to "prevention of specific diseases." Hygiene and the study of body function was still in vogue in 1931, but *eleven* small-size pages were devoted to some sex education!

By the mid 1950s there was less emphasis on the systems of the body per se. See, for example, Kilander's *Health for Modern Living* (310). Personality and mental health, dating, courtship and marriage, growth and development, nutrition and weight control, relaxation and recreation, study of stimulants and depressants, alcohol and tobacco, more extensive treatment of disease, planning medical protection, and national health resources were now typical of health education content.

## TODAY'S HEALTH EDUCATION

In the mid 1960s we apparently had returned to some emphasis on the function of the body's system per se and some effort at defining the importance of health education. In Miller and Burt's *Good Health* (390) we see that physical fitness was added and that there was more extensive treatment of sexuality and reproduction. Family planning appeared, and strong emphasis on problems related to tobacco, alcohol, and narcotics was continued. Consumer health appeared on the scene, as did greater emphasis on *community* health and personal appearance. Some coverage of emergency first-aid procedures and a discussion of radiation dangers were also included.

Another development has been health education's recent trend in the

direction of the conceptual or "big ideas" approach to learning. Perhaps it is too early to call this a trend, but considerable time and money was spent on the development of a conceptual model for school health education, and it appears most likely that the approach will be more and more utilized. The approach is based on the precept that the "big ideas" or basic concepts are better retained and assimilated than are facts. There are three key concepts: growing and developing, decision making, and interactions. The new terminology may be somewhat misleading, but when we turn to the ten concepts subsumed by the three key concepts, the picture becomes clearer. These ten concepts are listed in Table 3.1. Categorized under each of the ten concepts there are from two to four substantive elements, a total of thirty-one of these in all. The curriculum then is organized around these substantive elements in terms of goals for the learner and behavioral outcomes at a particular developmental or grade level.

There is yet another bit of evidence that leads one to believe some health educators have awakened. The *ideal* approach is no longer viewed as the textbook and lecture method; there are problem solving and experiments (as well as the older movie-film, posters, pictures and television methods). Although the idealistic new programs are not yet widely being used, the fact that they are being utilized at all is encouraging.

## THE FUTURE

As a final note and fitting close to the discussion of the question, "Where is health education?", let us say "not where it *has* been (fortunately!) but not yet where it can be." To be sure, there are encouraging signs as we have pointed out. But every school does not yet teach health as it should be taught (too many still do not teach it at all); and the

**TABLE 3.1 Ten Concepts for Health Education**

| |
|---|
| Growth and development influences and is influenced by the structure and functioning of the individual. |
| Growing and developing follows a predictable sequence, yet is unique for each individual. |
| Protection and promotion of health is an individual, community, and international responsibility. |
| The potential for hazards and accidents exists, whatever the environment. |
| There are reciprocal relationships involving man, disease, and environment. |
| The family serves to perpetuate man and to fulfill certain health needs. |
| Personal health practices are affected by a complexity of forces, often conflicting. |
| Utilization of health information, products, and services is guided by values and perceptions |
| Uses of substances that modify mood and behavior arise from a variety of motivations |
| Food selection and eating patterns are determined by physical, social, mental, economic, and cultural factors. |

SOURCE Health Education: A Conceptual Approach to Curriculum Design. Washington, D.C., School Health Study, 1967, p. 20

conceptual model is still just that—a *model;* the test is yet to come—can and *will* these dynamic new ideas in health education be utilized effectively?

## THE DEVELOPMENT OF RECREATION

### EARLY BEGINNINGS

The concern over the problem of learning to deal with leisure has sprung from several sources. Americans tend to believe that the phenomenon of free time is unique to the modern, industrialized societies. You may recall that the ancient Greeks (and the Egyptians before them) had a great many festival days during the year and that the Romans are reputed to have had nearly as many holidays as workdays. It is generally conceded that the failure to wisely utilize this time was a contributing factor to the downfall of the Roman empire.

Of course, festivals and religious holidays are only one means of assessing the degree of recreation engaged in by ancient societies. There is no doubt that man has always been compelled to play. "Abolish religion and recreation from the face of the earth and within two moons they would return again" (72, p. 106). Both of these activities involving man's attempts at self-fulfillment and search for meaning have played significant roles in the development of civilization. Recreation is a means of dealing with boredom, and it is clear that much of the leisure of man has been spent in imaginative ways of meeting challenges presented to him by his culture.

Although recreational pursuits must have persisted among common people during the Dark Ages, the available records concerning such activity deal only with royalty and Church figures. The Renaissance produced another kind of activity to be utilized during leisure, that of learning. It was during and after the Reformation, however, that the roots of the "evils of idleness" idea took hold.

The period of colonialization carried cultures of established societies throughout the world. Religious differences provided the impetus for many of the early settlers to leave Europe, and some of the persecuted groups colonizing the inhospitable new lands developed attitudes that have had profound effects on succeeding generations.

### ATTITUDES TOWARD PLAY

One of the most enduring of these attitudes was that developed concerning work. Any unproductive activity was deemed sinful. Because play and other recreational activities were obviously unproductive, they were equated with the sins of idleness and sloth and were firmly discouraged. Many of the recreational activities of that time were "disguised" by the addition of a work element. Husking bees, barn raisings, and similar events became events to look forward to with great anticipation. Even though the harsh environmental conditions were gradually controlled, the Puritan "work ethic" persisted,

and its influence spread throughout the early United States.

It is of considerable interest to note the relationship between recreation and the Church during this time. Although "play" was not permitted (or was frowned upon, at least) the religious activities became extremely popular. Lonely settlers came great distances to attend evangelistic meetings in tents or cleared areas. Accounts of these services give an indication of the extent to which religion, in a sense, became a substitute for recreation (161, p. 80).

It was not until the Industrial Revolution, however, that the American citizen (as well as the European) began to learn what leisure meant. Less time was required to meet the requirements of life, and more money became available for recreational use. The expansion of business opportunities, however, became almost a "game" in itself. Because work had always been a legitimate outlet for one's energies, the excitement of commercial competition, getting and spending, attracted the attention of many.

The money produced by this rush of business activity, associated with the growth of cities around industrial complexes, made possible the development of "spectating." Horse racing, professional foot racing, boat racing, and other types of competition attracted large throngs of spectators, frequently taxing the capacities of transportation and housing facilities. "Phineas T. Barnum of circus fame stands out as the leading figure of this period in amusing the populace. No struggle between dramatic standards and popular taste ever troubled the master showman of them all. He was not one whit interested in art; he was interested in entertainment" (161, p. 122). Barnum's ability to provide a vast variety of entertainment for the people of the 1850s may have had a significant effect on their readiness to pay for the opportunity of viewing athletic teams compete.

The first recorded football game between colleges was played in 1869 between Princeton and Rutgers. Three games were played, and there were twenty-five players on each side. It took a few years for the game to catch on (it was banned because of increasing roughness), but after some rules changes and after further exposure, the groundwork was laid for the establishment of rivalries that have since attracted millions of spectators.

The growth of sports not only provided people a chance to observe and to be entertained but also gave them new outlets for involvement and participation. In addition to these, activities such as bicycling and then "joy riding" in automobiles provided opportunities for fun and excitement that are still enjoyed today.

## MODERN LEISURE

The changes of the first half of the twentieth century are of little interest to the youngster who has never known anything but television, supersonic aircraft, and computer technology. He will be interested, however, in the effect that the changes produced in

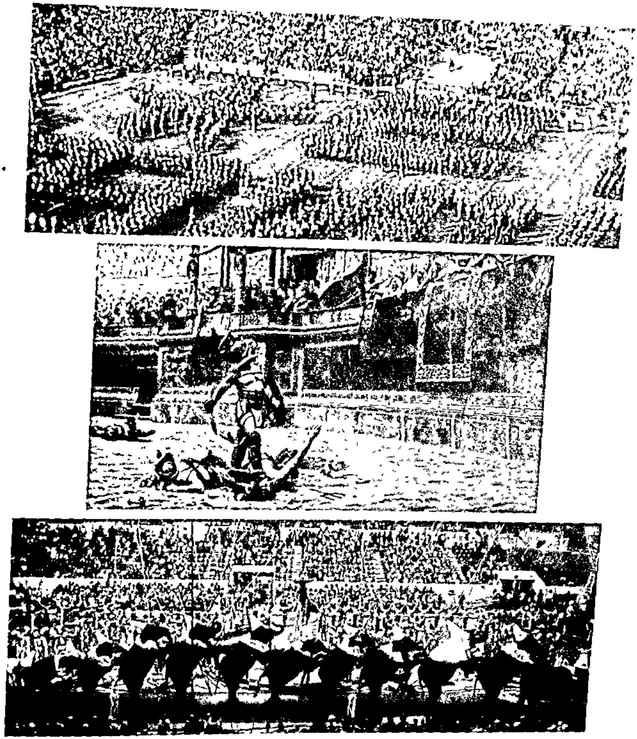


**FIGURE 3.4** Modern man is little different from his predecessors in his love for the diversion and entertainment provided by colorful and violent spectacles. (Top, half-time entertainment at college football game; center, "Pollice Verso," 1874, by Jean Leon Gérôme, now in Phoenix Art Museum, Phoenix, Arizona; bottom, Ringling Bros. and Barnum & Bailey Circus photograph.)

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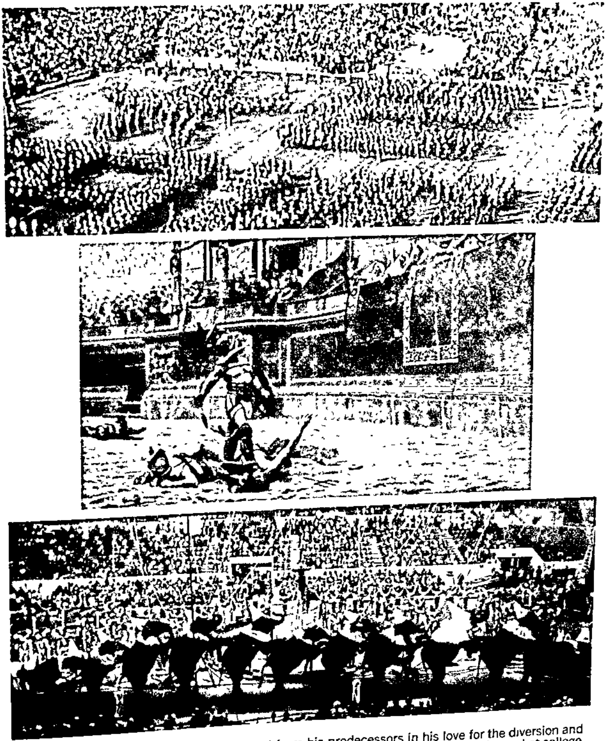

**FIGURE 3.4** Modern man is little different from his predecessors in his love for the diversion and entertainment provided by colorful and violent spectacles. (Top, half-time entertainment at college football game; center, "Pollice Verso," 1874, by Jean Leon Gérôme, now in Phoenix Art Museum, Phoenix, Arizona; bottom, Ringling Bros and Barnum & Bailey Circus photograph.)

society by automation will cause in his personal life. It is precisely this kind of problem that the professional recreation worker will be trying to help solve.

## THE FUTURE

In justifying the need for recreational leaders and recreational programs, authorities point to a number of factors of which we are all basically aware. The forty-hour work week may be reduced to thirty within the next ten years. Increased wages and the guaranteed annual wage (which has become a reality for more and more people) coupled with an unprecedented production have increased the spending power of millions. Unemployment rates have seasonal fluctuations, but unemployment insurance helps to reduce the difficulties encountered during such times. The population explosion has created a housing and a school crisis in the cities. The burgeoning social expectations of minority groups have produced a restlessness and a social mobility that is unprecedented in the history of the world. The combination of increased leisure, more money, and unfulfilled expectations is expected to produce social and economic problems whose solutions will require the dedicated efforts of a great many people. We can expect increased concern on the part of government and industry as well, and not always on the basis of objective humanitarianism. Concerning the relationships of recreation to the economy, *Fortune Magazine* reported: "The leisure market may become the dynamic component of the whole economy" (161, p. 393). In reviewing publications of the amounts spent by Americans for equipment and services related to recreation (such as the *Life* article, "A $40 Billion Bill Just for Fun"), Dulles came to the conclusion that "Play had to be considered a virtue for the sake of the nation's prosperity" (161, p. 392).

### Work and Play Today

As a consequence of the factors that have been mentioned (as well as others), the concepts of "work" and "play" in our society have undergone curious changes. This change is pointed out in Chapter 17 in terms of the implications it has for physical education in the schools. It has just as serious implications for nearly all other professions.

After reviewing the research in this area, Sessoms notes:

> *Traditionally, Western man has viewed work as the major determinator of social status, but with advanced technology and mechanization, work is losing its social importance. Increasingly . . . leisure has replaced work as life's central interest.*
>
> *For many, it is not an easy transition. There are feelings of guilt and shame; leisure has been for too long synonymous with idleness, and the prestige ascribed to adult play is woefully low. Work may not be meaninfgul but neither may be leisure* (506, p. 44).

". . . neither may be leisure"—this is the problem that faces the prospective recreation professional. The task

## SUMMARY

Examination of the current status of physical education reveals a strong emphasis on physical fitness for the masses of students while a concern for the teaching of physical skills is limited to a relative few. Highly talented individuals, especially those engaging in varsity sports, appear to receive the bulk of attention given to intensive skills training.

A brief historical survey indicates that the fitness objective has long been likened to the objective for preparedness for war. While fighting and hunting skills were prized in past ancient cultures, the early Greeks stand out for their remarkable contributions to physical education as well as to all other aspects of civilization. Few if any cultures have had as profound an effect upon the modern philosophies of physical education as that of the Greeks.

Other cultures, including that of the once-proud Roman Empire and some of those rising out of the dismal years called the Dark Ages following Rome's fall, have made contributions to physical education. With the Renaissance and the Protestant reformation, great strides were taken toward regaining the levels of civilization once enjoyed.

With the advent of improved education, ideas about the role of physical activity in man's life again stirred some interest. "Systems" of physical education gradually developed around individuals and came to be identified with specific countries.

With expansion of colonial territories in the new world, these systems became incorporated, adapted, and modified to blend into the new cultural setting. The phenomenal growth of population centers, educational systems, and economic opportunity provided by our civilization has created a culture that has affected American physical education in many ways. The rapidity of growth and the absence of clear-cut goals has placed physical education in the position of being forced to justify its very existance at a time in history when it should, theoretically, be making its greatest contribution. The challenge is clear and the opportunities will be great in the years immediately ahead. Realization of the potential contribution of physical education will be dependent upon the dedication and preparation of tomorrow's physical educators.

Health education, as distinct from interests in medicine itself, is really much younger than physical education. Practices of early people, including taboos and rituals designed to preserve health, were often specified by decree or custom. Aside from scattered records, little is known about efforts to educate people concerning personal health practices.

The origins of health education in the United States as well as its evolu-

tion can be conveniently traced by examination of the content of popular health texts from the early 1930s up to the present time. Recent years have seen a great expansion in breadth of health topics as well as intensified interest in new and more effective ways of making health knowledge a meaningful factor in human behavior.

The history of recreation is as old as play itself. From a formal standpoint, however, the festivals of ancient peoples give us our first glimpse of organized recreation. Physical education and recreation suffered common fates during the Dark Ages and the succeeding years. Religion played a large part in formulating attitudes toward work and play, with the latter being, for a time, practically equated with sin.

The Industrial Revolution, accompanied by economic development and increased leisure, gave birth to an upsurge in recreational interest and activity. In the United States, these conditions contributed to a tremendously increased interest in spectator sports. Modern automation has only accelerated the trend to greater economic growth accompanied by increased leisure. The concepts of work, play, fun, job have become less and less clear as profound cultural changes have occurred with increasing rapidity.

Heavy responsibility for helping to create new value systems for an age of leisure rests with today's recreation personnel. The significance of recreation in American life within the next few years can scarcely be overemphasized.

## PRINCIPLES

1. Attitudes of a populace toward the concepts of work, play, leisure, and recreation have profound effects upon the vitality and direction of the society.
2. Failure to utilize free time in a meaningful, satisfying way can contribute substantially to the decay of an otherwise sophisticated society.
3. Historically, concern for the physical fitness of any population has been linked to the objective of military preparedness.
4. Physical education takes on profoundly different values when viewed from the standpoint of dualism (mind versus body) as opposed to monism (a single, unitary being).

## SUGGESTED READING

Dulles, Foster R., *A History of Recreation*. New York: Appleton-Century-Crofts, 1965.

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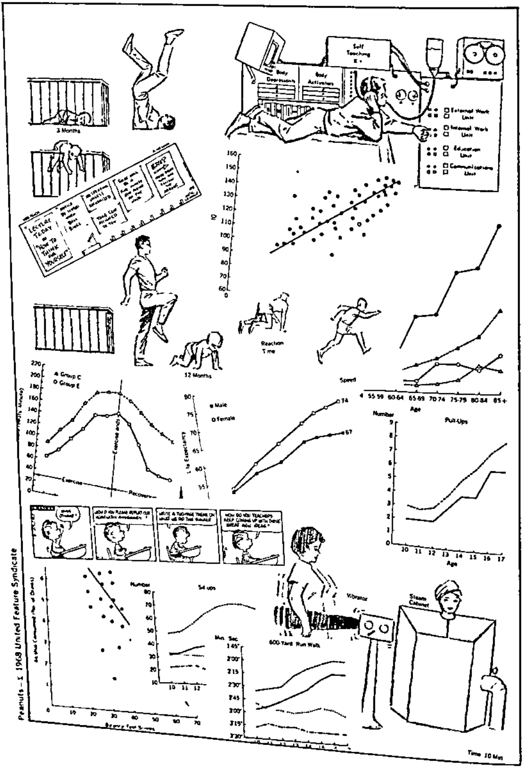
Van Dalen, D. B., E. D. Mitchell, and B. L. Bennett, *World History of Physical Education*. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1953.



3 Months
Self Teaching Kit
Body Depressants
Body Activators
External Work Unit
Internal Work Unit
Education Unit
Communications Unit
LECTURE TODAY "HOW TO THINK FOR YOURSELF"
IQ
Reaction Time
12 Months
Speed
Age
Group C
Group E
Exercise ends
Exercise
Recovery
Male
Female
Life Expectancy
Number
Pull-Ups
Sit-ups
Vibrator
Steam Cabinet
600-Yard Run Walk
Min. Sec.
Beauty Test Scores
Time 10 Min

# PART II

# Essential Understandings

# Critical, Systematic Thinking

## Chapter 4

The "Miss Peach" cartoon (Figure 4.1) says it. Our experience with college students says it. Students say it, and some have started to rebel against its repression. Some educators are enough concerned about it to try to do something about it. We have attempted to do something about it in our own classes. This book is an attempt to do something about it. What is "it"? "It" is the need for developing an atmosphere for creativity and critical, systematic thinking. Unfortunately, our educational system has for years promoted just the opposite: conformism and regimented, "Polly-parrot learning." Fortunately, formal education has never been 100 percent successful in converting all of its products to conformist automatons incapable of critical and creative thinking. But, in our opinion, it has been far too successful. We see an effort in many schools to get away from this kind of "education," which is really more like indoctrination. You are fortunate if you have come up through a system of schools where the problem-solving approach to education is in vogue or at least present to some degree. If you are not so fortunate, you will have to go through some kind of a conversion process. It can be a painless con-

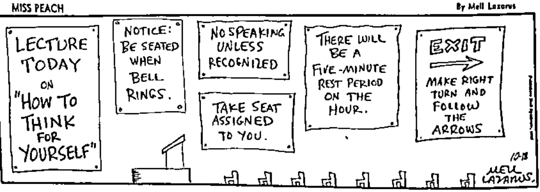



FIGURE 4.1 Miss Peach by Mell Lazarus © Field Enterprises Inc.

version because it would seem to us to be more in keeping with the nature of man to wish to be his own master, so to speak, and not to be an automaton. Perhaps not. Perhaps all persons are not built of such stuff. But it can be said with certainty that only the ones who can think creatively and objectively and who can use the problem-solving scientific process will be the true professionals in our fields (see page 12). The rest will be technicians; for the ability to think systematically, critically, and creatively is the earmark of the professional. The professional *can think effectively for himself. He can make decisions.*

## PROBLEM SOLVING AND DECISION MAKING

You have already learned something about making decisions. Although technically there may be little difference between making a simple "choice" and making a "decision," the difference is essentially one of the stakes involved. Thus, it may be relatively simple to choose which shoes one will wear with a particular suit but quite another matter to decide on whether to pursue a career in engineering, medicine, or education. Choice is often based on whim or fancy; wise decisions are based on facts.

As society becomes more and more complex, the range of decisions one is called upon to make increases. Thus, it has become necessary to develop ways of insuring that wise decisions are made. In business and government, when the stakes are high, complex and technical systems have been developed to aid in the process of decision making. The laws of probability have been utilized by the statistician and a whole field of study called "decision theory" has been born. Although the ordinary citizen does not have at his disposal the resources of industry, he can adapt the basic ideas successfully employed there to make appropriate decisions in his own life. It is important that we understand the scientific principles that can be applied to the problem of making sensible decisions.

There is nothing particularly complex about the application of these principles. A review of the steps that should be utilized in problem solving and decision making may be helpful.

## LOGICAL STEPS

The first step is to recognize the problem. One may be aware that things are not right but have difficulty in identifying what is wrong. In this case, some careful observation of the circumstances is indicated. A scientist might call this "preliminary data collection." This careful and more purposeful kind of observation should help in formulating a theory about what steps might be useful in identifying and overcoming the problem.

Next, armed with this knowledge of what conditions actually exist, a theory or hypothesis about the kind of action that appears to be desirable can be formulated. This hypothesis may be worded in predictive terms: "If situation A exists (as it appears might be the case), then action B should result in outcome C." The careful statement of the problem in the form of a hypothesis is a major step in the direction of solution of the problem.

Once the hypothesis has been set up, it should be a relatively simple matter to test it in order to see whether the predicted results actually occur. If they do, then the appropriate course of action is clear. If the expected result does not come about, the original theory should be adjusted in the light of the new facts available and a new hypothesis set up for testing. In this manner it is often possible to determine not only "better" decisions for important problem-solving action but often "best" decisions.

Let's take a look at an example of how an individual might go about applying some of these principles to a personal problem. Suppose Mr. X has recently graduated from college. As a typical student he has always been fairly active in extracurricular activities that have kept him relatively trim and fit. As fall rolls around, he discovers that all last year's winter clothes are too tight. About the same time he notices that he seems to be a little soft and bulgy around the middle. Taking his cue from these simple observations, he makes certain other preliminary observations. He consults the most recent height-weight tables provided by his insurance man and discovers that he is about fifteen pounds above the weight recommended for one of his height and general stature. His physician also tells him that he is indeed overweight and should reduce. In studying his diet in order to determine whether his caloric intake is excessive, he discovers that it is about the same as it was all the time he was attending college.

Like all of us, he has been the target of a great deal of advertising concerning the benefits of vibrators, diet foods, drugs, exercise fads, and other "packages" designed to get rid of unwanted pounds and to restore a youthful appearance. Unlike many of us, however, he has taken the time to check into some of the claims made for the various reducing systems and has concluded that weight gain or loss in the

normal healthy person is the result of the balance between caloric intake and energy expenditure.

One obvious course of action in this case is simply to reduce caloric intake to an appropriate level and to attempt to maintain weight by diet control. This, of course, implies the necessity of enduring moderate levels of chronic hunger, possibly for the balance of his lifetime. On the other hand, an increase in energy expenditure should aid in the reduction of excess weight. Mr. X reasons that because he has not changed his dietary habits since college days his weight problem must be the result of the reduced level of physical activity inherent in his occupation. He hypothesizes, therefore, that if he compromises by increasing his level of activity by playing handball or tennis three times a week and by reducing his caloric intake moderately, he should be able to regain and maintain a more desirable weight and still enjoy a sense of fulfillment at the dinner table.

(It should be noted that there are other possible courses of action open to Mr. X, all dependent, of course, on the approval of his physician. One possibility might be to change the composition of his diet from predominately carbohydrates to proteins. Another might involve the use of appetite-inhibiting drugs or the institution of a series of starvation diets. In this case, however, he has selected the elements that seem to be most advantageous to him and has manipulated them into a pattern he plans to test.)

Once under way, Mr. X keeps a regular weight chart in order to assess his progress. At the end of six months he discovers that he has lost eight pounds and has suffered no discomfort. In addition, the bulge around the middle has nearly disappeared. At the end of a year he finds that he has slightly exceeded his goal and that his weight-loss pattern has leveled off. His hypothesis has been proved to be true and his problem has been solved.

Other examples of the scientific problem-solving approach could be given, but they are all based upon the same general considerations. The single, most important step in the whole process is the formulation of an appropriate hypothesis. When knowledge of underlying conditions is limited, it is, of course, difficult to visualize other courses of action. It has been observed that "a proper construction of the question is often half of its solution." But in order to "phrase the question," or sometimes even before one can recognize that he *has* a specific problem, it is necessary to have some understanding of the basic facts. In terms of individual health and physical fitness it is important to know, for example, what the relationships are between physical activity and caloric balance. One needs to understand how the human machinery utilizes its fuel and how it responds to various changes in grade and amount of fuel.

For the solution of other kinds of problems relating to individual welfare it is necessary to be acquainted with certain other basic facts about how the body works, not only as a biological machine but also as a *person*, an integrated human being with needs,

desires, aspirations, hopes, and fears. This is not to say that one must become a physician or a psychiatrist, but only that it is important that we all become acquainted with certain basic things about how we work and think and learn.

Merely possessing this knowledge is, of course, not enough. It takes a little creativity, a willingness to manipulate and examine the facts in order to be able to come up with a properly phrased question—a productive hypothesis.

## ACQUIRING DECISION-MAKING ABILITY

In order to develop this ability to make intelligent decisions based on facts and knowledge of the process, practice is necessary. No one is born with the knowledge of how to solve his own (or anyone else's) problems. This is a task that takes practice just as any skill requires practice if improvement is to take place. For this reason you should take the opportunity to experiment with some particular problem as it relates to your own health and fitness. You will need to give attention to the techniques of observing the available information, formulating your hypothesis and collecting and analyzing your data. You will also need to learn how to avoid certain errors in drawing conclusions, and, finally, you should use your imagination in the general application of your findings.

It should be apparent that the decision-making process just described in no way rules out individual human judgment. On the contrary, it simply harnesses it and provides it with much more favorable operating conditions.

The steps used in this "do it yourself" approach are simple. First, be aware of the general problem to be studied. Next, hypothesize about the outcome of the experiment: What do you think the results will be? You will then engage in the actual collection of data, which you will then need to organize in a meaningful manner. This usually involves drawing a picture of the results in the form of a graph, as well as organizing the data into chart form. When more than one person is involved you will also want to convert the performances of individuals into a single mean or average performance. Following this you should be able to look back at your original hypothesis or theory and decide whether or not it has been supported. Finally, you should make some judgments about whether your findings have any practical or general application.

### OBVIOUS PROBLEMS

There are too many serious injuries in our intramural touch football program.

An alarming percentage of our sophomores are contracting venereal disease.

Attendance in our recreation program has dropped off 42 percent in the last month.

A certain ninth-grade student has suddenly stopped dressing for physical education class without apparent reason.

Students have asked for a program in sex education but parents have a negative attitude.

Our community has a heart disease death rate and a mental illness frequency that are well above even the national averages.

### SILENT PROBLEMS

Are my students really assimilating the important health concepts? If not, how can I improve my program to that end?

Is each of my students as physically fit as he or she can be? If not, why not? Then, what can I do to motivate them to improve within their individual capacities?

Is there a better method than my current one of teaching swimming skills?

Is my recreation program really meeting community needs?

Are my basketball players properly conditioned, or is there a better way than I am currently using?

Does regular exercise cause changes in the heart muscle that make it more resistant to coronary artery disease?

These are but a few examples. How would you go about solving these problems or answering these questions? You can certainly add many, many more.

The general pattern for decision making can be applied in every case, but creativity will be required to select the specific approach that best fits the particular problem. Some will involve experimental research, others will require only an appraisal of the *existing* situation. But each involves the basic pattern: recognition and identification of the problem (which may involve preliminary observations and/or data collection); a formulation of an hypothesis; testing of the hypothesis by appropriate means (collection of data, experimentation); drawing conclusions and making a decision.

## REPORTING EXPERIMENTAL DATA

As an illustration of how experimental research data are commonly reported, a simple experiment, performed during a class period, is presented. A simplified version of the format used by many scientific journals is used as the model.

### AN EXPERIMENT IN HUMAN STRENGTH

I. Purpose: The purpose of this experiment was to observe the relationship between isotonic strength and isometric strength.

II. Hypothesis: The original hypothesis was that isometric strength should be found to be greater than isotonic strength.

III. Procedure: Six student volunteers

were selected from a class. Students were tested singly and were not permitted to observe each other's performance.

A. Isometric test. Each student, in turn, was required to stand with his back against the wall and his feet on a low platform about eight inches from the wall. A five-foot bar was placed in his hands (palms up) after the elbows were flexed to a measured angle of 90°. A chain and cable arrangement extended from the center of the bar to a spot on the platform directly between the ankles of the subject.

Each subject was asked to make a maximal attempt at further flexing the elbows. The tension produced in the cable under these circumstances was measured by means of a cable tensiometer. Results were recorded to the nearest pound.

B. Isotonic test. The subject assumed a position similar to that described above; the maximum amount of weight (to the nearest five pounds) that each subject could "curl" from thighs to chest was determined. A series of trials with approximately five minutes of rest between each trial was instituted to determine maximal isotonic strength (the greatest load that could be curled *one time*). The first attempt was made with 60 percent of the maximal isometric performance placed on the bar. For subsequent trials, adjustments were made in increments of five pounds. All subjects' maximums were determined within four trials.

IV. Limitations: The small number of subjects was a limiting factor in this study. The order of presentation of the exercise tasks may have produced a fatigue effect which may have distorted the results.

V. Results and Discussion:

A. Results. The raw scores of each individual are shown in the table below.

| | STRENGTH | |
|---|---|---|
| SUBJECT | ISOMETRIC | ISOTONIC |
| 1 | 72 | 45 |
| 2 | 90 | 60 |
| 3 | 103 | 75 |
| 4 | 85 | 60 |
| 5 | 60 | 35 |
| 6 | 70 | 45 |
| Total | 480 | 320 |
| Average | 80 | 53 |

The graph in Figure 4.1 shows a comparison of isometric and isotonic strength. The mean isometric strength was found to be eighty pounds, whereas the mean isotonic strength was fifty-three pounds.

B. Discussion. The apparent difference may be due to the fact that the angle of attachment of the biceps muscle to the bone is very efficient at 90° but progressively less efficient in either direction from this position. Thus, moving the bar bell

through the full range, which begins at about 180°, where the angle of attachment is less efficient, is more difficult than exerting force at the single point of the relatively ideal 90° of elbow flexion.

VI. Conclusions and Implications: On the basis of the data *collected in this experiment* the following conclusions are drawn:

1. It appears that isometric strength is greater than isotonic strength, at least at 90° elbow flexion. It is possible that at other angles, isometric strength could be less than isotonic.
2. Under these conditions the isotonic strength would appear to be approximately 68 percent of the isometric strength.

It might be implied from this experiment that it is possible to exert more force through muscle contraction in slow movements than in more rapid ones.

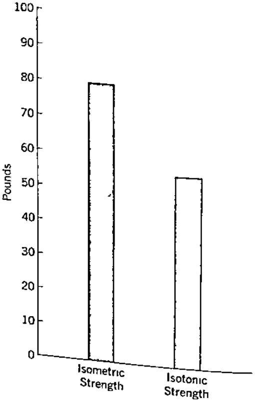
## CONSTRUCTING AND INTERPRETING GRAPHS

In the sample experiment above, a simple graph was used to illustrate the experimental findings. In this book, one of the techniques for facilitating your understanding of health and fitness information will be simply to present a table or graph that is self-explanatory and is not discussed at length. Despite the fact that graphs are widely used in popular magazines, newspapers, and books, many of us are not really graph-oriented. In order to assist those who have difficulty in interpreting graphic materials, several examples are presented below.

### THE BAR GRAPH

One of the simplest and most effective graphs for showing comparisons between groups or individuals is the bar graph. As shown in Figure 4.2, the message conveyed by such graphs is easily grasped. Here the average isometric strength of six men (eight pounds) is

FIGURE 4.2 A comparison of the means of the maximal isotonic and maximal isometric strength of six men.



represented by the bar labeled "Isometric Strength." The other bar represents maximal "Isotonic Strength," and extends upward until a value of fifty-three pounds is reached on the vertical scale.

In order to make the discussion of all graphs more simple, certain terms have been adopted to make communication easier. For example, the vertical scale on all graphs is called the *ordinate*. The horizontal scale is called the *abscissa*. Traditionally, the lowest or poorest scores of values begin at the bottom of the ordinate. When such a scale is used on the abscissa, the low values are placed at the extreme left and the high values at the right.

## THE LINE GRAPH

The line graph is another device commonly used to show changes in status. Here changes taking place over a period of time can be conveniently illustrated, as shown by the acceleration of the heart rates of the two groups shown in Figure 4.3. As can be seen, the average heart rate of the twelve men in Group E was 82 before the exercise began. As soon as they started walking on the treadmill, the heart rate began to increase. As the exercise progressed, the heart rate rose to a maximum of 160 beats a minute, where it leveled off and remained until the exercise was terminated. It can be seen that as soon as the exercise stopped the heart rates of both groups began to drop back toward normal. It should also be noted that the average heart rates of the men in Group E did not rise as high as shown for those in Group C, and also that Group E returned to normal more quickly than did Group C. In observing a plot like this we might conclude

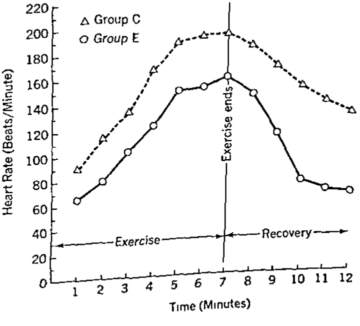



FIGURE 4.3 Mean heart rate responses to exercise of two groups of twelve men.

that the men in Group E were in better condition than those in Group C because they performed the standard task with less effort (as indicated by lower heart rates) and recovered from the exertion more quickly.

## THE CORRELATION PLOT

A device frequently used to illustrate the degree to which separate qualities are related is the correlation plot or scattergram. If we were interested in the relationship between IQ and academic success, for example, each individual in our study would need to have two scores: an IQ score and a cumulative grade point average. By arranging the possible IQ scores from low to high on the ordinate of the graph, and the academic achievement scores in the same manner on the abscissa, each individual can be represented by a single point on the scattergram. As shown in Figure 4.4, an individual with an IQ of 122 and a grade point average of 3.2 would be placed as indicated by the open dot. The solid dots all represent other individuals.

These questions now arise: Are IQ scores and grade point averages related, and if so, how closely? And is this relationship positive or negative?

It should be evident that if grade point averages went up one unit for every increased IQ unit, we would have a perfect positive relationship. All points would lie along one line and this line would form a 45° angle with either the ordinate (vertical scale) or the abscissa (horizontal scale). This would be a perfect positive correlation represented by a correlation coefficient of 1.0. Figure 4.5 illustrates such a correlation, indicating that academic achieve-

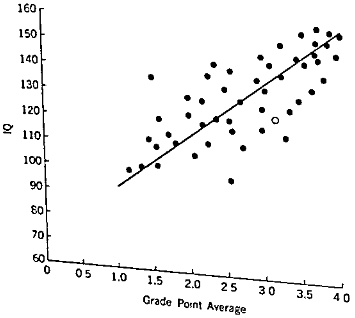



FIGURE 4.4 A scattergram comparison (correlation plot) of IQ and grade point average indicating the line of best fit. Open dot represents a student with IQ of 122 and grade point average of 3.2.

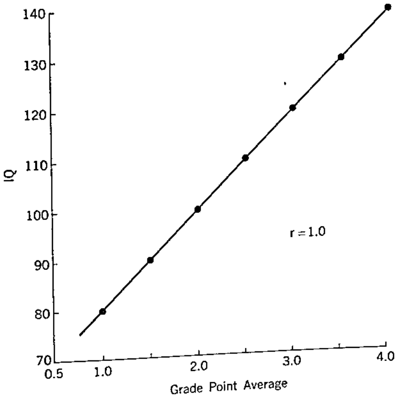



FIGURE 4.5 Hypothetical plot that might be obtained if IQ and grade point averages were perfectly correlated.

ment (as measured by grade point averages) is directly proportional to IQ.

Of course, two given factors are almost never perfectly correlated. A more realistic picture of the relationship between our two variables is shown in Figure 4.4. Here it will be seen that the scores, while forming a definite "directional" trend, do not all fall on the same line. A "line of best fit"[1] has been superimposed on this pattern to show the actual slope of the scattergram pattern. Because all points do not fall exactly on this line, and because the line does not slope at a 45° angle, the correlation is *less than* 1.0, and actually would be about .76. This is still a fairly strong correlation, indicating that there is a strong relationship between the two variables. That is to say, there is a strong tendency for those with high IQ's to attain better grade point averages.

Sometimes two items are related to each other, but in a *negative* direction. There is such an inverse, or negative, relationship between amounts of alcohol consumed and a test of balance (Figure 4.6). In this case a correlation of −.84 indicates strongly that the more alcohol one consumes the more poorly he is apt to score on the balance test.

If there is no correlation between two variables, the correlation coefficient approaches zero as shown in Figure 4.7.

There are other kinds of graphs, but these are the ones most commonly en-

[1]This can be calculated mathematically. There is only one line of best fit for a given set of points.

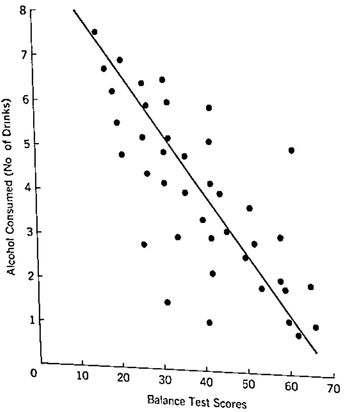



FIGURE 4 6 Hypothetical plot of scores on a balance test and amount of alcohol consumed. Line of best fit indicates a negative correlation.

countered. Sometimes a great many variables are all recorded on the same graph, so that considerable patience is required to determine exactly what is shown by the various curves. Interpretation of these more complex graphs is basically no different, however, from the interpretation of the simple ones just discussed; they merely require a little more study.

It should be pointed out that a high positive or negative correlation is not necessarily indicative of a cause-and-effect relationship. A correlation coefficient can be calculated or portrayed in a plot where two kinds of numerical scores are available, whether or not a real and practical relationship exists between the two measures. The classic example goes something like this: There is a high correlation between the number of storks per month flying over a large city and the number of births per month; this obviously is coincidence, not cause and effect, and does not prove that storks do, after all, bring babies! It may also be that two factors *are* related, not just coincidentally, but from the experimental data we cannot establish which is "cause" and which "effect." Be careful to use some common sense in interpreting correlations.

## CREATIVITY

It is our hope that you will have ample opportunity in your formal college

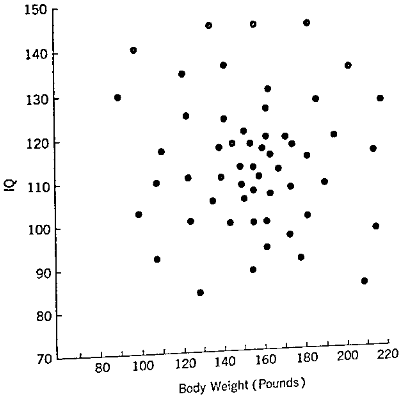



FIGURE 4.7 Hypothetical plot of IQ and body weight. No single line of best fit can be established; no relationship exists between the variables.

education to develop a creative, critical, and systematic approach to your profession. Given that opportunity, some will respond, some will not; some will become professionals, some will not. Of course it takes more than a knowledge of *how* to solve a problem or *how* to conduct an experiment or research project to be the complete professional. One must be alert to the subtle personal needs of the persons with whom one is dealing and to the program needs that *all too often are not very obvious.* One cannot assume that "no news is good news," that "no complaints from administration and no complaints from students" means that a program is sound and effective. This is where it takes a professional, a dedicated person who can and *will* think critically, creatively, and systematically. In other words, one cannot sit back and wait to solve problems that are brought to him. He must, as often as possible, seek them out and initiate solutions before they become any more detrimental to the welfare of the people involved and to the ultimate success of the program. This is part of the "creativity" aspect of the professional's job and is, of course, *directly dependent upon his interest in his program and its participants.*

The concepts presented in this chapter lead logically to a discussion of health and well-being of the individual because the creative and systematic thinking is ultimately directed at im-


FIGURE 4 8 © 1968 United Feature Syndicate.

proving programs so as to promote and improve man's well-being. In the next chapter, we will discuss health and physical fitness concepts as one of the specific and common concerns of health education and recreation.

## SUMMARY

The ability to think systematically, critically, and creatively distinguishes the professional from the technician. He can and should make intelligent decisions.

The professional must be alert to "silent" problems as well as those which have become obvious.

Use of appropriate bar and line graphs provides for better understanding of the data and their interpretation.

## PRINCIPLES

1. The problem-solving or scientific method involves recognition and identification of the problem, formulation of a working hypothesis, testing the hypothesis, drawing conclusions and making some kind of decision.

2. There is a basic format for reporting research results which insures that the essential elements are covered and which also facilitates follow-up research by other investigators.

3. A positive or negative correlation or relationship which exists between two variables may mean one of three things:

   a. Nothing—the numerical manipulation provides a high correlation but the basic assumption is in error and thus the correlation is meaningless (example: high correlation between physical fitness and height when sample included ages 6 through 17).

   b. Relationship is meaningful but "cause and effect" is not established (example: high negative correlation between daily activity and degree of obesity in rats; which causes which?)

   c. Relationship is meaningful and "cause and effect" has been established (example: follow-up study to one in (b.) alone indicates that rats forced to exercise daily do not become as obese as those forced to remain sedentary; thus inactivity apparently precedes obesity and not vice versa).

## EXPERIMENTS AND EXPERIENCES

1. List some examples of variables which might be correlated but in a meaningless way.
2. Write up two research reports (one a survey, one an experiment) as follows:
   a. Identify a problem or question which interests you.
   b. State your working hypothesis.
   c. Describe the procedure in careful detail (as though you have carried out the study).
   d. Describe and graph three possible alternative results (two extremes and "nothing").
   e. Draw conclusions based on each of the three alternative results.
   f. Make a decision based on each alternative result.
3. Describe how you might apply the problem-solving method to a theoretical nonexperimental problem in physical education, health education, or recreation.
4. See how many examples of inappropriate use of statistics you can find.
5. Many of the experiments and experiences listed at the end of other chapters will also provide opportunity to develop the scientific, problem-solving techniques of inquiry.

## SUGGESTED READING

Hanson, D. L., "Influence of Hawthorne Effect Upon Physical Education Research," *Research Quarterly*, 38:723, 1967.

Huff, D., *How To Lie With Statistics.* New York: W. W. Norton & Company, Inc., 1954.

Teraslinna, P., "On Publishable Research Articles," *Research Quarterly*, 38:154, 1967.

VanDalen, D. B., "Hypotheses and Deduced Consequences," *Research Quarterly*, 33:316, 1962.

# Health and Physical Fitness Concepts

## Chapter 5

In order to discuss *health* and *physical fitness*, the status of both, and the means of improving these qualities, we must come to some understanding of what these terms mean. We will operate on the basis of the following definitions, treating these qualities for the moment as though they were separate, distinct, and unrelated qualities (which, in reality, they are not). Health is generally taken to mean "freedom from defect and disease" or, in a more positive sense, "mental and physical well-being" or "soundness of body and mind." Physical fitness, although there are many and varied definitions, each with its own peculiar tangent, is generally taken to mean "the capacity to carry out physical tasks" (especially those tasks requiring considerable muscular effort, which tasks in turn require a well-conditioned neuro-skeleto-muscular system and/or circulo-respiratory system).

We will first take a look at our current health status, then discuss some misconceptions about physical fitness before analyzing current fitness status. We will then direct attention toward the theoretical relationship between health and physical fitness, the effects of regular exercise on health (longevity,

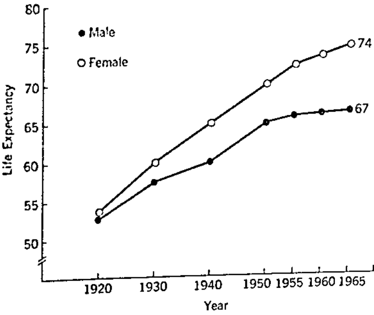



**FIGURE 5.1** Life expectancy for men and women in the United States, 1920-1965. Adapted from *Statistical Abstract of the United States* (578)

resistance to infection, and so on), and, finally, will discuss health appraisal.

## CURRENT HEALTH STATUS

It is difficult to find incontrovertible evidence regarding the actual causes of gross population changes in health status. We can, however, identify relevant facts and figures. These data, coupled with discrete observations and new statistics presented from time to time, can aid in the process of deduction. You can then reach some logical conclusions of your own. These conclusions, in turn, can be interpreted in the light of health needs. Again, we have employed the problem-solving technique: the data are presented in simplified form, thus challenging you and allowing you to reach your own conclusion as to the meaning of each particular table or graph. Study each table and illustration carefully and ask yourself, "What does this imply?" You should be looking for answers to many questions: What are some of the most likely causes of our national health problems? Are automation and overmechanization involved? Do not expect simple answers; in some cases the evidence is conflicting. There are not enough pieces to complete most of these puzzles, but each piece of evidence presented does somehow fit into the larger puzzle; ultimately all conflicts will be explained on the basis of new and better studies. At present, these conflicts are actually good and essential: they promote further and more careful work that will lead to better answers. In some cases, you may be able to resolve and explain an apparent paradox. In any case, you will be armed with more information

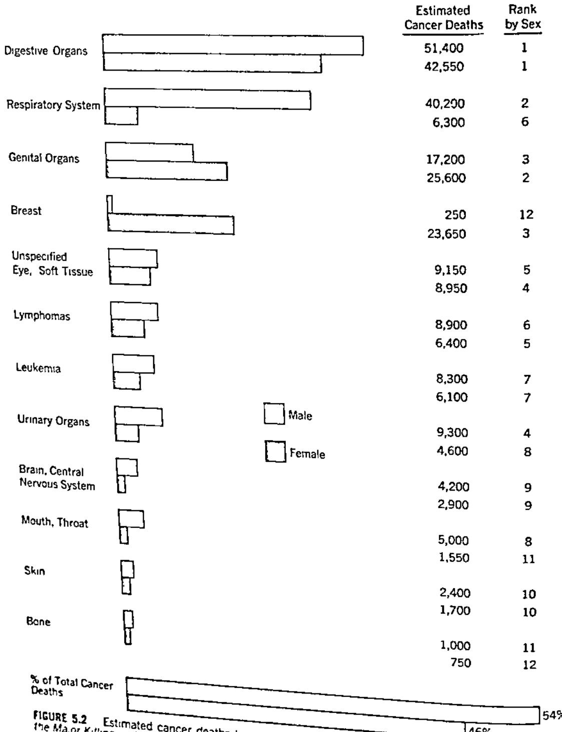



**FIGURE 5.2** Estimated cancer deaths by site and sex, 1964, United States. Data from *Facts on the Major Killing and Crippling Diseases in the United States Today* (172).

with which you can better interpret current and future scientific developments as they are reported, and you should come to a better understanding of our current health status and how it can be improved.

**TABLE 5.1 Selected Causes of Death in the United States, 1900-1965 (Deaths per 100,000 Population)**

| CAUSE OF DEATH | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 | 1965 |
|---|---|---|---|---|---|---|---|---|
| Major cv—r[a] diseases | 345 | 372 | 365 | 414 | 486 | 511 | 522 | 516 |
| Heart | 132 | 159 | 159 | 206 | 295 | 357 | 369 | 367 |
| Arteriosclerotic heart disease | — | — | — | — | — | 213 | 276 | 287 |
| Cancer | 63 | 76 | 83 | 97 | 120 | 140 | 149 | 154 |
| Influenza and pneumonia | 203 | 162 | 208 | 103 | 80 | 33 | 37 | 32 |
| Diabetes | 10 | 15 | 16 | 19 | 27 | 16 | 17 | 17 |
| Cirrhosis of the liver | 13 | 14 | 7 | 7 | 8 | 9 | 11 | 13 |
| Ulcer | 3 | 4 | 4 | 6 | 7 | 6 | 6 | 5 |
| Tuberculosis | 194 | 154 | 113 | 71 | 46 | 23 | 6 | 4 |
| Bronchitis | 46 | 23 | 13 | 4 | 3 | 2 | 2 | 3 |

[a]Cardiovascular renal

SOURCE: U.S. Bureau of the Census (578)

**TABLE 5.2 Days of Disability Due to Chronic Disorders, per Year per 100,000 population, United States Average for 1958 and 1959**

| CAUSE | RESTRICTED ACTIVITY | RESTRICTED TO BED | WORK LOSS | SCHOOL LOSS |
|---|---|---|---|---|
| C-v | 269 | 93 | 100 | 6 |
| Digestive | 115 | 42 | 75 | 3 |
| Arth.-rheumatoid | 141 | 36 | 46 | 0 |
| Other | 738 | 236 | 327 | 81 |

SOURCE: U.S. Bureau of the Census (578)

**TABLE 5.3 Average Prevalence of Selected Chronic Conditions, Number per 1000 Population**

| CONDITION | 1957-1959 | 1959-1961 |
|---|---|---|
| Heart disease | 29.5 | 30.2 |
| High blood pressure | 30.8 | 32.3 |
| Ulcer | 14.4 | 15.9 |
| Arth.-rheumatoid | 63.9 | 65.6 |

SOURCE: U.S. Bureau of the Census (578)

TABLE 5.4 Selective Service Statistics, Percent Rejected, World War I through 1965

| | WW I | WW II | 1950-56 | 1958 | 1960 | 1962 | 1963 | 1965 |
|---|---|---|---|---|---|---|---|---|
| Rejected | 21 3 | 35 8 | 33.5 | 41.9 | 44 8 | 49.8 | 50 0 | 44 0 |
| Medical only | — | — | 15 7 | 19 0 | 22.1 | 22.7 | 24 0 | 21 8 |
| Mental only | — | — | 13.6 | 18.0 | 18 8 | 21 5 | 21.6 | 18 6 |
| Both | — | — | 3 1 | 3.3 | 2.9 | 3 0 | 3 1 | 2.3 |

SOURCE U S Bureau of the Census (578).

## HEALTH KNOWLEDGE

No discussion of current health status would be complete without some consideration of what kind of knowledge our population has about matters of health. This leads us to consider the question of medical quackery and old wives' tales. To further acquaint you with the problems associated with the public's lack of health knowledge and wisdom, two excellent articles are reproduced here.

### Health Education vs. Medical Quackery*

JAMES L TRAWICK
DIRECTOR, DIVISION OF CONSUMER EDUCATION
BUREAU OF EDUCATION AND VOLUNTARY COMPLIANCE
FOOD AND DRUG ADMINISTRATION

Children learn at an early age that there is a certain amount of dishonesty and fraud in the business world. My 9-year-old son suffered a disappointment bordering on shock when he received a toy he had seen ballyhooed on television. The difference in what he had expected and what he actually got was remarkable indeed. That same youngster has now learned to be wary of the cereal box-top come-ons, after similar disappointments. Come to think of it, he is pretty sophisticated in his small world as a consumer.

Likewise, my teenage son has learned some lessons about gasoline additives to double your mileage and so-called high-powered spark plugs advertised to the high school set. When I was his age, I had no car, but I had freckles. Freckles were not as socially acceptable then as they are now, and I learned a few things about cosmetic advertising after spending several dollars on freckle cream.

If there is any bright side to this kind of experience, perhaps it is simply in the "once burned, twice shy" adage, since such experiences may help to immunize young people against the bigger—and more dangerous—types of fraud they will meet up with as they grow older.

In the health field, we call this kind of fraud and cheating "quackery." The definition is important because by today's usage, quackery refers not only to the quack practitioner but also to the worthless product and the fraudulent promotion.

It is not a life-or-death matter if the teenage debutante does not get the results she expects from a bust developer or an acne

*From the *Journal of Health, Physical Education and Recreation*, 36 28, 1965, by permission of the American Association for Health, Physical Education, and Recreation.

lotion, or if the tanning preparation used before the high school prom leaves her face covered with orange-red splotches a few days later. But it may be a life-or-death matter if a few years later that same young woman discovers a lump in her breast and decides to try out some quack remedy because she is afraid to tell her doctor about it.

The knowledge of how to seek competent medical advice in such a situation, how to evaluate labeling claims and advertising, books used in promotions, articles in magazines, claims of so-called health lecturers and of house-to-house peddlers, and radio and television promotions—such knowledge may in fact be the most important health education message that youngsters can be taught today. I am not going to presume to tell you as professional teachers how to do your job of teaching. But I think you will be interested in some of our material on the subject of health education as it relates to medical quackery.

These are true-life cases from FDA files. For example, consider the outer carton from a package of Nutri-Bio—a vitamin-mineral preparation containing a number of miscellaneous ingredients such as unsaturated fatty acids, bioflavonoid complex, alfalfa juice, and various minerals and trace elements. Back in 1961 and 1962 Nutri-Bio was promoted with labeling statements that "the American people are the most undernourished people in the world even though overfed" and that Nutri-Bio was of special dietary value because the ingredients were of natural or organic origin.

I mention this type of product first because nutritional quackery is an important subject for teachers, and yet a difficult one because of the well-known atrocious dietary habits of teenagers. This is complicated by the fact that children nowadays have been brought up on vitamins (it used to be cod liver oil) and many of us are conditioned to believe that supplementary vitamins and minerals are an absolute must for everyone if he is to enjoy good health. This is not so!

The fact is that food faddism and nutritional quackery rank as the biggest racket in the health field today. This quackery thrives on the major themes of the food faddists—and the willingness of people to believe them. These are:

1. That all diseases are due to faulty diet;
2. That soil depletion and the use of chemical fertilizers cause malnutrition and poison our crops;
3. That modern methods of food processing and cooking have robbed our foods of their nutritional value; and
4. That anyone who has the "tired feeling" or an ache or a pain is probably suffering from a "sub-clinical deficiency" and needs to supplement his diet with some special concoction.

Nothing could be further from the truth. While there are, of course, special circumstances in which dietary supplementation is necessary, advice of a competent physician is needed to identify vitamin or mineral deficiencies and to prescribe their proper treatment.

The promotion of Nutri-Bio a few years ago provided a classic example of food faddism gone wild. More than 75,000 full and part-time sales agents were selling Nutri-Bio at $24.00 per packet for a six-months' supply for one person. The promotion involved one of the largest collections of pseudo-scientific literature and books ever assembled. Nutri-Bio was being recommended as the answer to practically all health problems—anemia, arthritis, cancer, diabetes, heart troubles, nervousness, and so on. It promised health, beauty, athletic ability, radiant living, and the capacity to stay young and vital. It was even recommended as a cure for juvenile delinquency. The sales distribution plan was based on a chain-letter type scheme and many people

# Principles of Modern Physical Education, Health, and Recreation

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Holt, Rinehart and Winston, Inc.

NEW YORK / CHICAGO / SAN FRANCISCO
ATLANTA / DALLAS / MONTREAL
TORONTO / LONDON / SYDNEY

# Preface

Our purpose in writing this book has been to provide for students planning careers in health, physical education, or recreation an introduction both to the scientific core of information about human physical activity and health-related behavior and to the philosophy, procedures, and purposes that we consider relevant for professional experience in the disciplines these students have elected to follow. We have wanted our book to serve the needs of teachers and students who are seriously involved with the very foundations of health, physical education, and recreation.

In preparing the text and assembling its supporting data and demonstrations we have been mindful of the changes occurring in education as the result of world-wide social and political turmoil, changes that have affected the professions of physical education, health education, and recreation just as profoundly as they have all other aspects of modern life.

Like all of today's college students, majors in physical education, health, and recreation reflect the strengthening of academic standards throughout the school system. They also exhibit the increased sophistication characteristic of earlier physical and social maturity. Although the complexities of modern life have multiplied the pressures placed upon them, there is little doubt that young people are better prepared than ever before to cope with the problems left to them by preceeding generations.

Today's students come to college not only academically well grounded, but also philosophically committed to idealistic goals. It is now up to the colleges and universities to give these eager young recruits the modern weapons and training they will need if they are to be successful in attacking the crucial problems they will have to face. It is increasingly clear that their success (and the survival of their professions) depends upon their ability to establish themselves in the minds of the public as *knowledgeable experts* in matters of human physical activity and health-related information and behavior.

We believe that if students are to develop an adequate expertise in their profession, they must first develop a healthy self-respect based upon pride in their *potential* professional contribution. The fostering of this desirable self-image can best be facilitated through early exposure to the true *substance* of the profession. In expressing this philosophy, we have wanted:

1. To introduce the student to his chosen profession by indicating not only what his profession is, but also what it can become.
2. To provide a practical handbook of important principles and a useful source of documented information for the use of the student throughout his preparatory training as well as for the graduate on the job.
3. To establish an integrating element that could function to help the student perceive the relationships among the many courses he will encounter during his professional training.

As a means of organizing some of the ideas contained in this book we have utilized two terms borrowed from the field of neurology. The expression EFFERENT CONCEPTS has been used to identify those ideas dealing with the effects that physical activity and health-related behavior have upon man's biological function, his social conduct, his philosophy, his art, and his culture in general. Conversely, AFFERENT CONCEPTS refer to those ideas that are concerned with how man's physical makeup, his environment, his philosophy, and his culture act to influence, modify, or direct human physical activity and health-related behavior.

As a further attempt to aid students in understanding the material presented, an extensive glossary is included. As each technical term is introduced it appears in boldface, indicating that a definition can be found in the glossary.

So as to distinguish the present effort from the earlier book entitled *Physical Education: A Problem-Solving Approach to Health and Fitness* (Holt, Rinehart and Winston, Inc., 1966), which resulted from a collaboration

with our colleagues Donald Stolberg and Maryellen Schaefer, we should like to emphasize that the 1966 work was written as a text for a new type of combined health and physical education course, one directed more specifically to students not concentrating professionally in health, physical education, and recreation. It was inspired by the idea that today's more mature, intelligent college student deserves to be given the opportunity to study and evaluate for himself the available evidence concerning human physical activity and behavior related to health and fitness.

Many people agreed that this kind of information is valuable for the general student but pointed out that it is of even greater importance for the student preparing to work professionally in health, physical education, and recreation. The obvious objection to the use of the first book for majors has been, however, that it is addressed to a different audience and fails to consider several topics of particular importance to professional students.

Thus, in this book, which is designed for majors, we have deliberately retained significant portions of the scientific content from the 1966 volume and even expanded them considerably into the fabric of the preponderance of new material making up the present text.

We would like to express our appreciation to the many fine people on our own faculty and to those at other institutions who have contributed so much to the genesis of the ideas expressed in this book. Dr. Donald Stolberg has been a particularly stimulating co-worker, and many of his ideas have found their way into this text. We are grateful to several other dedicated professionals whose imaginative work with the introductory majors' course at the University of Toledo has contributed in many ways to our writing of this book. Dr. Harriett Williams, Dr. John Drowatzky, Dr. Jack Schendel, Dr. John Burt, Dr. Jan Broekhoff, and George Gilmore have all made valuable contributions to the philosophy and content of our program at this level.

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W. F U
P B. J

*Toledo, Ohio*
*October 1969*

# Introduction

Times are changing rapidly. The ever increasing complexity of society demands that we expand our understanding of man and his world if we hope to survive as individuals and as civilized nations. At the same time that pleas for increased breadth of knowledge are being raised, there arises an insistence upon increased professional and technical specialization. The beleaguered student is caught in the middle.

Today's college student, whatever his major field of interest, is expected to master facts and concepts that will give him far greater expertise upon graduation than has been possessed by preceding generations. In becoming an expert, however, the student has found it impossible to pursue as wide a variety of interests as once was possible.

Few people would deny that physical education, health education, and recreational leadership have become distinct and separate professional specialties. There is simply too much of a specialized nature within each field to expect one individual to become adequately prepared in more than one of them in four years. Recognition of this fact has led to the establishment of separate curricula for the preparation of professional workers in each of these areas.

It is not surprising to discover that these curricula contain certain very important common elements, since the three professions share several of the same important objectives. All three professions, for example, are directly concerned with helping man to understand himself and his biological and psychosocial needs. All three are devoted to fostering habits and techniques that will serve not only to help preserve man's health but also to enable him to achieve a full, satisfying life.

The purpose of this book is to provide students with a summary of concepts and principles important to health educators, physical educators, and recreation leaders alike. This is not meant to imply, however, that every concept and principle discussed in the text is considered equally important to each of the professions. Neither is it assumed that all important concepts and principles have been covered, or that judgments made concerning the placement of emphasis are infallible.

We do believe that each chapter in some way provides a substantial portion of the general foundation that must undergird the more specific knowledge and skills of persons embarking on a career in health, physical education, or recreation, and that there is no concept or principle presented that does not hold significance for at least one (if not all) of these professions.

Chapter 17 (Concepts Underlying Special Programs) provides an example of material that is not of equal concern to recreation specialists, to health educators, and to physical educators. While only members of the latter group would be expected to become actively involved in physical activity programs for the atypical child in school, health educators must certainly be aware of the need for such programs and should be intimately concerned with fostering sound philosophies of physical education and recreation for atypical persons as an integral part of the total health education program. Recreation leaders will be increasingly called upon by communities to provide facilities and programs for handicapped youngsters and adults; knowledge of appropriate opportunities, as well as understanding of the limitations imposed by various conditions is essential to the provision of meaningful programs.

Other examples of mutual concern are provided in the brief sections dealing with diseases and disorders of the various systems, and those related to exercise concepts. In the case of diseases and disorders, awareness of these matters may be of pratical significance to the practicing physical educator and recreation specialist even though knowledge of such disorders may be of more direct concern to the health educator. In the second instance (exercise concepts), physical educators will regard concepts pertaining to physical activity as being of paramount importance. The potential health benefits and dangers of various kinds of exercise and physical activity will also be of more than passing interest to the health educator. The recreation leader will make considerable use of such infor-

mation in planning sound, effective programs to meet the leisure needs of the community.

As a summary of principles and a review of important concepts, it is apparent that this book is intended to go beyond serving as an introduction to the professions involved. It is hoped that as you progress through your academic programs, its pages will provide practical assistance in the development of projects and that its many references will serve to give initial direction in the search for further information for papers and presentations. When you near completion of your training, we hope this book will assist you in integrating the detailed and widely divergent aspects of your preparation. And as you begin your professional career, you will find it useful as a review of pertinent ideas and important professional responsibilities and objectives.

Because it is meant to be more than an introductory text, we have included brief sections dealing with procedures and programs. The chapters in Part IV (for example, Essential Emergency Procedures, and Selected Issues) are intended to provide some exposure to these less conceptual but nonetheless basic concerns of the true professional.

It is hoped that this book and the philosophy out of which it has developed will help to identify and strengthen the common goals of physical education, health education, and recreation leadership in order that through their separate, unique contributions these professions may fully achieve their potential for the improvement of man and society.


THE BLADE· TOLEDO, OHIO,
Rewarding Experience
Alcindor Working With Underprivileged Youngsters

# PART I

# Essential Backgrounds

# The Prospective Professional

## Chapter 1

### VITAL QUESTIONS

"Why am I here?" "Why have I chosen a career in physical education—or health—or recreation?" These are questions that each person should ask himself early in his educational career.

There are, of course, any number of possible answers to such questions. However, the nature of these answers may be of vital importance to you and to your profession as well.

Some categories into which typical answers fall are:

1. The desire to pursue personal interests and aspirations; to do something one enjoys.
2. The desire to influence the behavior of others; to achieve acclaim or status.
3. The desire to be of service to others who need assistance.

It is obvious that one's motives might involve all of these desires. It is equally possible, however, that a given individual might enter a profession primarily motivated by one of them. It is conceivable, for example, that one might choose to become

LEW ALCINDOR
*Finds youth stimulating*

# Rewarding Experience

★ ★ ★ ★ ★ ★ ★ ★ ★

## Alcindor Working With Underprivileged Youngsters

NEW YORK (AP)—Lew Alcindor, who could now be getting ready to lead the U.S. basketball team in the Olympics, is working instead with the underprivileged youngsters of New York.

"I don't know of anything I've done yet that's been more rewarding," he says. "We know what we've done has worked. It's been that good. It's wonderful."

This is the same man who not long ago said of his decision not to try out for the Olympic basketball team:

"We have a racist nation and my decision not to go for the Olympics is my way of getting the message across."

Alcindor, the 7-foot plus center of UCLA's collegiate champions and already considered one of the greatest of modern basketball players, was a cinch to make the Olympic team.

He is now part of Operation Sports Rescue along with other famous athletes. Teams each headed by an athlete talk to youngsters in small groups.

"Young people idolize athletes," says LeRoy Wilkins, director of the project. "If you can get athletes to say the same thing that religious leaders and educators are saying, they'll listen."

The objectives of Operation Sports Rescue are to instill self-pride in youngsters of the street, to impress on them the value of remaining in school, to underscore the value of independence by acquiring marketable skills, and to encourage youngsters to take an active part in community affairs.

Among the athletes working on the project in addition to Alcindor are Emmette Bryant of the Boston Celtics, Ron Blye of the New York Giants, Tom Hoover of the Houston Mavericks, Bobby Hunter of the Harlem Globetrotters, Carlos Ortiz and Jose Torres, the boxers, Oscar Robertson of the Cincinnati Royals, and Walt Bellamy of the New York Knicks.

"Alcindor has worked almost as much as all the rest put together," said one of the project officials.

Operation Sports Rescue is sponsored by the Mayor's Urban Task Force and financed by the Bristol Myers Co.

FIGURE 1.1 As they become mature, most great athletes become interested in identifying with a "cause" that is greater than self. (Copyright AP; photo, World Wide Photos.)

a health educator because he loves biology or immunology. A love of history might lead another to become a history teacher. A successful high school athlete might choose to enter physical education because he loves sports competition.

The question is, have we chosen this profession because we wish to prolong pleasant experiences in our own lives, or is it that we wish to extend to others the benefits of enjoying for themselves the kinds of experiences we have found meaningful and pleasurable?

Maturity brings changes in philosophy and objectives. It has been said of the typical athlete that when he is young, he wants to be *good*; as he grows older, he wants to be good for *something*. This increasing awareness of the influence that he can have on others through his athletic achievements can lead him in many different directions. Figure 1.1 illustrates the fact that many people who have achieved athletic fame find even greater rewards in forgoing the pursuit of further public acclaim in favor of giving of themselves to others who really need help.

It is doubtful that maturity can be gained by any means other than personal experience. Therefore, the only real justification for pointing out the matters discussed in this chapter is that responsible decisions (if and when they are made) depend upon the avail-

ability of accurate information. On the other hand, if one is to really profit from his educational experiences, he must approach them with a sense of perspective that makes the various courses take on meaning.

At the very beginning of a career it is important to have a serious talk with oneself. It is important to make some definite decisions now (painful though the process may be) about what your real goals in life are. In making these decisions you are really spelling out your philosophy of life. Do you wish to serve others or to be served? Are you anxious to become a coach or teacher or recreation leader in order to be in a strong position to exert an influence in the lives of youngsters, or does this kind of life appeal to you because of the opportunity it gives you to stay in the environment you love? Steinhaus has said that the person who is interested in getting the most dollars does not have the instincts of a teacher (543, p. 256). This does not mean the teacher should not expect fair remuneration for his expensive training and important work. It does mean that if his goal is the gathering of material goods, he does not really have the capacity for putting other people's welfare ahead of his own.

At this point it should be pointed out that no good coach or teacher is entirely unselfish in his motivation. Of course he is fond of the subject he is teaching. Of course he loves the excitement of hard fought contests. But he recognizes that these experiences must be directed toward meeting the needs of the youngsters rather than meeting his own needs. In other words, the truly *professional* person recognizes that his primary responsibility is the improvement and nurture of the student; the


FIGURE 1.2 "Maybe I ought to become a surgeon . . I've always enjoyed cutting and stitching"

professional's own enjoyment and even his professional advancement must be secondary considerations. And certainly neither his enjoyment nor his advancement are ever to be attained at the expense of his students.

In learning to subjugate one's own selfish interests to the best interests of others, many people have found unexpected rewards. No one would deny the thrill to be gained from putting a team of talented performers together and guiding them step by step to victory. Even more gratifying, however, can be the experience of developing the capacity to analyze the subtleties in complex performance and then to creatively utilize this knowledge in producing performers when there were apparently no performers. Anyone can slavishly initiate the systems of others, but what could be more soul satisfying than being the originator of a concept, system, or idea? Anyone should be able to win with good material, but what can be said of the man who can win with players who began as only mediocre performers? And what of the person who uses his influence to expand the creative imagination of an "ordinary" child? That man has the qualities of a *teacher*!

As soon as one begins to direct his thinking in terms of his profession as a service to others, it becomes obvious that the number of youngsters he can help is much larger than he may have realized. Although interscholastic athletics can directly involve a few elite performers, all of the students in a school system profit from a well-conceived program of physical education. Because the life of a normal child is intimately bound up with physical activity, physical educators, recreation leaders, and health educators take advantage of every opportunity to utilize natural urges and desires in achieving a variety of worthwhile educational objectives. However, this must not be understood to mean that such objectives will automatically be achieved. We will have a great deal to say later on about the necessity for careful planning and preparation, if *any* of the potentially valuable outcomes of physical education, health, and recreation are to be realized.

## INTERRELATIONSHIPS OF THE PROFESSIONS

To someone who has thought of physical education only in terms of the opportunities it provides for the teaching of motor skills and coaching, it may not be clear what physical education has in common with health education or recreation education. On the other hand, if it is recognized that regular physical activity of appropriate kinds has a profound effect on the physical welfare of all people in terms of growth and development and on the prevention of certain degenerative diseases, it becomes obvious that the positive health of people ("preventive medicine") is a common objective of both physical education and health education. Furthermore, the kinds of activities we engage in during our leisure hours, the types

of diversions we pursue as a means of maintaining our sanity in times of stress, are mutual concerns of all three professional areas. Certainly all three are ultimately concerned with the well-being (physical, mental, and spiritual) of the individual. The means utilized in the attainment of these lofty objectives may vary considerably, and the place within the community where these objectives are sought may also be different. But to the extent that all three are concerned with frequent use and knowledge of physical activity in meeting the physical, mental, and spiritual needs of human beings, they are related.

It is also important to recognize that because of the fact that physical education, health education, and recreation are all concerned with the effects of their programs on man's welfare, they all require training and background in the physical and psychological makeup of man.

Certainly it would be foolish to presume that there are no major differences in the three programs under discussion. Although there may be even greater differences developing as changes occur in our society, there are still sufficient similarities to justify a common core of early training experiences. For this reason it is assumed that the readers of this book will represent all three professional areas, and it is hoped that even though illustrations and examples may be taken from one or another particular field, it will be realized that the principles involved are intended for physical educators, health educators, and recreation specialists alike.

## THE QUESTION OF "MEANING"

After Hillary first conquered the terrifying heights of Mount Everest, he was asked why he would take such terrible risks and subject himself and others to such hardships in order to reach the top of a mountain peak. His famous response of "Because it is there!" seems, somehow, unsatisfactory. To most of us, sports, games, and other vigorous activities are *means* to the achievement of some goal rather than *ends* in themselves. Sometimes our actual purposes or goals may not be clear even to ourselves, but generally we can identify some motive for our actions such as the physical challenge involved, love of competition, desire to excel, better health, fitness needs, or, simply, the pleasure derived from success.

Because it is possible to derive different kinds of outcomes from a given activity, it becomes necessary for the educator to decide what specific outcomes he wishes to produce. How does one go about deciding what his specific aims are? Or should one simply provide instruction in the desired skills and give people the opportunity to participate and let *them* worry about the outcomes of this kind of behavior?

In physical education, for example, there are teachers who have no desire to get involved in the questions of "meaning" in physical activity. Their only concern is to teach people *how* to perform certain activities. The development of skill is their ultimate and only objective. Whether or not the learner continues to utilize the skills, whether

he derives any social, psychological, or physiological benefits, or whether he understands that there may be some such benefits are of no concern to this individual.

On the other hand, there are teachers who are deeply concerned about the values that students may be developing through participation. These teachers spend considerable time and effort in organizing their instruction so that skill development is accompanied by the acquisition of physical fitness. They strive to be certain that students understand the benefits and limitations of specific activities in terms of fitness and other factors. These teachers are concerned with the function of physical education in the total educational picture. These two types of teachers (those concerned with "meaning" and those not) are representative of two divergent philosophical viewpoints that characterize not only physical education but also health education and recreation.

## TECHNICIAN OR PROFESSIONAL?

To view the physical educator, health educator, or recreation leader as a technician means that he deals primarily with techniques. There is no implication that the *quality* of his work is inferior. There are excellent technicians and there are poor technicians; their distinguishing characteristic is that the *scope* of their activity is comparatively narrow. The technician's responsibilities are limited to the actual implementation of a program. He *administers* the activities that are set up by someone else. In some cases he may actually select the activities in his program, but this selection is based on the fact that they are being used by someone else. In short, the technician is concerned only with the practical matters of getting the program across to the students. He is not really concerned with *why* particular activities are presented at a certain level in the curriculum. The *theoretical* aspects of the function of his profession are neither his concern nor his responsibility. Someone else makes the decisions about what is "good."

The philosophical considerations and analytical processes that go into determining *why* the technician is teaching what he is teaching are the hallmarks of the professional. He must have the depth and breadth of knowledge to understand the needs of people and the means by which these needs can best be satisfied. He must be able to critically evaluate the effects of his program and make appropriate revisions. His *number one* characteristic is capacity for critical thought and analysis. He must be able to answer the question "Why?"

It is probably true that some people are more suited to the role of the technician than to that of the professional, and vice versa. It is apparent, for example, that most athletic coaches are technicians. How many different offensive formations or systems are in use in football today? Presently, the I formation (in which three backfield men line up directly behind the center and in which the fourth splits out to one side or the other as a potential pass receiver) is coming to the peak of its popularity. A few years ago nearly every

team in the country was using something called the split T. Prior to that we had the T formation that "revolutionized football." The old single wing is now nearly forgotten, and many players today have no idea how it would operate. Yet there was a time when it was considered the ultimate weapon of the game. (Similar "band wagon" phenomena could be identified in health education and recreation.)

Why do these changes occur? Do they just happen by coincidence? Is it a kind of spontaneous combustion? Or is there someone, somewhere, who has carefully studied the structure of the game and has analyzed, on a theoretical basis, the effects of certain kinds of action?

Why is there such widespread adoption of certain systems, to the exclusion of almost all others? Is it because the newest is the best? Could it be that when a famous college or professional coach is successful with a particular system, others rush to its adoption simply because he is successful with it? Are such innovations studied carefully with respect to the ability, size, or maturity of the players who are expected to execute them?

The coach who is a true professional fully understands the capabilities and limitations of his players and *creates* or *adopts* a system to fit these criteria. In order to create something new he must, of course, have some understanding of mechanisms, psychology, and even human anatomy and physiology. (Effective blocking technique, for example, is dependent upon factors in each of these categories.) Of course, the mere *possession* of a storehouse of knowledge is not enough. The ability to *use* this knowledge in unique ways is essential if one is to be a true professional in any career. Creativity and the ability to think critically are indispensable assets.

The question now becomes, should physical educators, health educators, and recreation leaders be expected to function primarily as technicians or primarily as professionals? Is there room for both? If so, how does one decide which to become? And if one decides to become an excellent technician (as a teacher of skills, for example) what assurance does he have that after a few years he will not wish to move into a position requiring the background and training of the professional?

Some schools have attempted to solve this problem by training at least all majors as potential professionals. Other schools have been content to concentrate on techniques and skills, assuming that most teachers and leaders will be functioning at the technical level.

Other professions have recognized a need to provide separate training programs for technicians and professionals. Medicine, for example, has the curriculum for the M.D. as well as the medical technician. Each is thoroughly trained in his field, but there is no expectation that the technician will ever be interested in assuming the responsibilities of the "professional." At the same time it is also assumed that the technician will be highly proficient through excellent training and diligent practice of his particular specialty. In other words, the assumption is that the jobs of the physician and the medical technician are *different*, requiring dif-

FIGURE 1.3 Examples of the "bandwagon" effect of certain attributes that often seem to gain uncritical approval because "everybody's doing it": (A) health movies, (B) jogging, (C) isometric exercise, (D) steam bathing.

ferent kinds of people. Neither job can be adequately performed without the conscientious dedication of the person involved. Although the physician's training requires greater depth and diversity of study (and therefore more time), that of the medical technician requires mastery of intricate procedures and techniques, many of which require constant practice for the maintenance of proficiency. In many cases these are techniques that physicians are never taught. They must rely on the skill and know-how of the technician to supply them with reliable information on the patient. It is obvious that an incorrect diagnosis due to either faulty judgment or unreliable information could be disastrous to the patient.

Thus, medicine has learned to handle many of its rapidly growing problems by a division of labor. A relatively few people are educated in the theoretical "whys and wherefores" requiring ex-

(C)

(D)

tensive background upon which understanding and judgment can be built. A great many people are recruited for training in the important, time-consuming laboratory tasks required in today's medical practice. The physician, with his theoretical knowledge, can then decide what procedures are necessary and can direct certain treatments that are then carried out by those who are primarily trained in the intricacies of the techniques involved.

There are signs that public education is following the lead of medicine. The preparation of the subject-matter *specialist* is being advocated; such specialists would act as "master teachers" and would determine what is to be taught and the sequence in which educational experiences would appear. The responsibility for determining what the "patient" needs and in what doses the prescription is to be administered would belong to the master teacher.

*ally and socially fit citizens through the medium of physical activities which have been selected with a view to realizing these outcomes (79, p. 40).*

Eight years later Bucher's definition had not changed substantially, but several pages were devoted to the development of an appropriate understanding of education in general.

*. . . when you add the word* physical *to* education *you are referring to the process of education that goes on when activities that develop and maintain the human body are concerned (80, p. 17).*

Such views differ little from that presented by Hetherington over fifty years ago. He defined *education* as a lifelong process in which the individual's powers were developed "and adjusted to a social order for complete living." He equated physical education with fundamental education and suggested that it provided the basis for all the rest of education (176, p. 115).

In 1910 T. D. Wood and Clark Hetherington began writing about "the new physical education" as a broadening experience in the lives of students. Wood concluded that "physical education should occupy itself with a program of activities which would foster physical health, but they should be considered as by-products while the pupil was being guided toward the acquisition of mental, moral, or social benefits" (176, p. 115).

Despite some widespread insistence upon narrowing the objectives of physical education to those of "preparedness" during and following World War I, the focus of physical education during the first half of the twentieth century was on the broad contributions that could be made to the development of good citizenship. As wartime emergencies and cold-war pressures persisted, the fitness objective periodically waxed and waned in prominence, but "there is little doubt that the idea of physical education as a contribution to 'education for complete living' has been the dominant theme of the field since the early years of the twentieth century" (176, p. 122). Physical education proclaimed its value in terms of the contributions it could make to the "total education" of the individual "through the physical." As a specific medium of education, it could (and did) claim widely diversified objectives accumulated from the procession of educational theories that have influenced education since 1900.

One of the great difficulties encountered in trying to state the nature of the profession lies in the nature of the term *physical education* itself. One of the great early spokesmen for physical education, Jay B. Nash, has said that the word *physical* is a misnomer because it implies that there is some sort of inherent conflict between physical and mental activity (418). The idea of "educating the physical" has long been dismissed because it is self-contradictory. Still persisting, however, is much of the original confusion that has always accompanied the use of this term. Nearly thirty-five years after Nash's time, despite suggestions by many leaders that the name of the profession be changed to reduce confusion,

the old problem is still with us. In 1967 Janet Felshin wrote: "The name itself is unfortunate, of course, because it explains nothing. We know—unless we wish to deny overwhelming evidence to the contrary and claim a dualism of mind and body—that the 'physical' cannot be educated, and even if it could be, as programs of physical education have long seemed to suppose, what would such an education mean?" Felshin goes on to point out that a true discipline must be defined in terms of its unique subject matter.

> *Physical education has been explained not as the "study of . . ." but as the "teaching of . . . ," which has resulted in the paradox of an academic discipline in colleges that is defined by curriculum in schools (176, p. 140).*

No one would seriously suggest that by merely changing the name of our profession could any of these problems be solved. On the contrary, the changing of the name would merely be a reflection of the changes in the concepts of physical education that are presently occurring.

If we are to survive as an effective, contributing, educational agency, we must accept the obligation to become experts in the unique subject matter of our profession: *human physical activity* in all of its ramifications and implications. The current emphasis is on determining logical boundaries for the discipline. Although agreement has not yet been reached on details, it seems evident that our profession is moving rapidly toward defining its overall concern in terms of "man in motion." Thus, the study of man as a *moving* being becomes the focus of the profession, and all aspects of human movement become the unique domain of its members. The physiological effects of physical activity (or lack of it), the sociologicial implications of sports and games, the mechanical efficiency of motor skills, the psychological effects of participation, as well as the esthetic aspects of movement as represented by the dance (but not limited to dance) would all be legitimate parts of the discipline. Study would be devoted not only to the effects of movement (or exercise) on the life and welfare of the individual but also to the effects that the various forms of movement activity have on his surroundings and his culture.

It should be evident that in this system the educational aspects of human movement (including the preparation of teachers, skill instruction, and coaching) would be only a part of the profession's concern. Study of the movement-related phenomena for their own sake, regardless of any practical applications, would be a legitimate pursuit of scholars. Conceivably, some people would find positions in industry, the arts, government, and other environments on the basis of their expertise in exercise or movement.

## NATURE OF HEALTH EDUCATION

The term *health education,* in contrast to *physical education,* enjoys much greater universality of definition. The term *health* is itself more broadly conceived now than formerly. Instead of the old

negative concept of "freedom from disease and infirmity," it now carries a positive connotation: good health is a "state of complete physical, mental and social well-being" (500). Thus *health education* is defined as "the process of providing learning experiences which favorably influence understandings, attitudes and conduct in regard to individual and community health" (410, p. 7).

Health education is typically viewed as part of a more diverse school health program that also includes health services to pupils and a program of healthful school living. In small schools, especially elementary schools, there is usually no health education specialist, and all three phases of school health are distributed among the teachers and administrators. There is usually no school nurse, and health appraisal is limited to yearly hearing and vision testing by a visiting school nurse or some other trained person. Larger schools, especially high schools, are more likely to provide a resident school nurse who is responsible for most of the services such as referral, caring for sickness and injury while at school, appraisal, and so on. Such a specialist is also usually responsible for evaluating and upgrading healthful school living, often in cooperation with the health educator. Apparently, more large secondary schools are providing full-time health education teachers, even though a recent survey shows that there are still few health teachers who are strictly full-time; only about 7 percent of all health teachers for grades 9 through 12 are full-time in health education (500).

Although, in one recent study, over 50 percent of all "large" schools sampled in grades 9 through 12 offered a separate health education class, only 25 percent required health education for all grades 9 through 12. These percentages are slightly different for medium-sized and small schools. Interestingly enough, more medium-sized school systems required health instruction (37.5 percent) than did large schools, and small schools were very similar to large ones in this respect (24.9 percent) (500). All too often the health educator's "other" responsibility is coaching. Experience has shown that this is often not the best combination of responsibilities, and it is usually the health education that has suffered. The professional health associations are concertedly attempting to change this situation. There is little question that well-trained, full-time health educators are needed to carry out most effectively the objectives of the new health education.

Health education cannot be handled by a technician. It is multidisciplinary in nature. Its content is "derived from medicine, public health, and the physical, biological and social sciences" (500). It covers diverse areas from the nature of disease to marriage and parenthood. Modern health education methodology draws from the behavioral sciences. The nature of today's health education is such that programs must be implemented and conducted by well-trained professionals, not part-time or, for that matter, full-time teachers who are trained only as technicians (see pages 12–16).

In summary, health education is:

1. Multidisciplinary in nature
2. Dynamic (growing and improving) in nature

## THE NATURE OF RECREATION

"The most dangerous threat hanging over American society is the threat of leisure . . . " (161, p. 390). "The darkest threat to the well-being of the working man and the subject of increasing concern on the part of organized labor" is the burden of leisure (161, p. 390).

These grim statements from responsible leaders leave little doubt about the urgency of preparing Americans to cope with leisure. The problem of leisure in American life is intimately bound up with our consideration of recreation. This is not to imply that leisure and recreation are the same thing but to imply that it is difficult to consider recreation in any setting that does not involve leisure.

### DEFINITIONS

There is no universal agreement about the definition of leisure. It has been claimed that no real definition can be given. One of the problems is that the term is used to describe a block of available time, a feeling about obligations or lack of them, a tool for social control, an opportunity for self-improvement, or as a part of a work-rest dichotomy. It has been stated that the term should really be a verb, "to leisure," implying that some kind of a conscious process is going on (4).

The traditional definitions of leisure regard it as a block of time. This time is distinct from that spent in work or preparing for work. Even this concept, however, has its problems.

*Work is something to fulfill yourself with. Work is something you love to do, not something you do with your eye on the timeclock. . . . A job is different. We have replaced the concept of work with the concept of the job. A job is something we give as little of ourselves to as possible and try to get as much for as we can, and try to get away from as soon as we can. . . . I don't use the term "leisure." I use the term "work" as I'm going to use the correlative term "play." It is work in the old sense which we need to recapture, work that gives us buoyancy and a feeling of expressiveness, work which we may do while we're making a living, but also that we may do off the job while we're making a life . . . .*

*I suggest that there is something very different from fun. There is play . . . Play is something which is totally expressive but doesn't end in a product. It doesn't have to end in a product. It is a thing in itself, worthwhile in itself"* (335).

Another has made the distinction between work and play in other terms:

*Work is the main course, the meat and the substance of our lives. Recreation is the dessert; we like it best in modest portions at the end of a good meal. When we try to substitute the dessert for the meal itself, we lose our taste for it (72, p. 23).*

Kelso and Adler stated the relationships among work, leisure, and play this way:

> *Play, like sleep, washes away the fatigues and tensions that result from the service occupations of life, all the forms of labor which produce the goods of subsistence and all the leisure activities which produce the goods of civilization. Play and sleep, as Aristotle pointed out, are for the sake of these services and socially useful occupations. Since the activities of leisure can be as exacting and tiring as the activities of toil, some form of relaxation, whether sleep or play or both, is required by those who work productively (300, p. 17).*

Brightbill has defined "play" as "the free, happy, and natural expression of animals—especially the human animal . . . When we refer to adult activity," he continues, "play might more fittingly be called *recreation*" (72, p. 30).

It is clear that when we refer to recreation we are not indicating any particular activity or class of activities. That which is work for one can easily be regarded as recreation by another. There is another important distinction to be made with regard to this term. Whereas recreation up to this point has been discussed in its general connotations, we are particularly interested in it as an organized service profession. Perhaps the term Recreation Education, or Recreation Leadership would be more appropriate in this context. In any event, we will need to look at both the general nature of recreation, its history and cultural implications, as well as at the systematized structure that has been created to deal with the leisure time activities of human beings.

# PROFESSIONAL OBJECTIVES

## OBJECTIVES OF PHYSICAL EDUCATION

It has been mentioned that regardless of the philosophical winds that have blown through physical education over the years, certain objectives have consistently retained a prominent place in the overall aims of the profession. Two of these are, of course, health and physical fitness. Because these particular objectives have persisted, it must not be assumed that they are universally accepted as being the most important objectives. Because disagreement about the relative importance of particular objectives is inevitable, it is impossible to make any list of primary and secondary objectives that will be satisfactory to the entire profession.

On the other hand, it is possible to group most of the commonly held objectives into a few descriptive categories. This has been done in a great variety of ways, some more detailed than others.

*Organic development* is generally considered to be of importance. This would include, among other things, the maintenance of health through good health practices and the development of physical fitness including sufficient strength, circulo-respiratory and muscular endurance to avoid excessive fatigue and to insure adequate energy levels. Although the development of sports and recreational skills is usually covered under a separate heading of *neuromuscular development,* it too could be considered one of the organic objectives.

*Social development* is another objective that is universally listed. The ability to function effectively with others and in groups is usually considered an important outcome to be sought through physical education. The emotional control that may be learned as a part of participation in games and contests is considered important. The acquisition of the qualities of cooperation, leadership, and related factors is also valued.

Closely related to social development is the objective of *psychological development*. Subsumed under this heading would be such things as improved personality characteristics, self-confidence, self-respect, and opportunity for self-fulfillment and self-realization. Frequently included in this category are claims that physical education contributes to the generalized learning abilities of the child. A few schools have deliberately designed their curricula with this objective uppermost in their thinking.

The *cognitive objective* (sometimes called *intellectual development*) is that traditionally stressed by teachers of "academic" subjects. Although health educators have long been concerned with helping students gain understanding of certain facts and principles, physical educators have generally limited their cognitive emphasis to knowledge of rules and strategy of sports and games. It is apparent, however, that the cognitive objective has assumed a role of major importance in recent years. Much of this book is devoted to the subject matter of physical education in the belief that the knowledge of such information is important to the welfare of professional and layman alike.

An objective that is seldom discussed is that of *philosophical development*. The great difficulty in dealing effectively with the teaching and evaluation of ethics and values is apparent. It has become increasingly apparent, however, that society is in urgent need of coming to grips with the problem of values in today's world. The question of whether sports and physical education effectively shape desirable value systems is one that must come under increasingly close scrutiny. The quality of the professional leadership available is obviously crucial to the attainment of any objective; it is of particular importance in the case of realizing philosophical objectives.

## CURRENT PRACTICE IN PHYSICAL EDUCATION

Which objectives are being stressed in physical education today? Of course, if one looks hard enough almost anything can be found somewhere. On the other hand, it is frequently possible to identify trends or patterns as they emerge in response to changing circumstances over a period of time.

After World War II, and especially since the late 1950s, the physical fitness status of American youngsters has certainly received a great deal of attention. Similarly, it is apparent that interscholastic athletics (beginning even at the elementary school level in some cases) are enjoying unprecedented popularity. On the basis of these informal


**FIGURE 2.1** Physical education has taken many different forms. Widely differing emphases can be found, as illustrated: (A) modern *dance*, (B) sports skills, (C) physiological effects of exercise, (D) gymnastics.

living and well-being and to concentrate on the most valuable of these. This would mean that even though society may value very highly the ability of its citizens to get along with one another peaceably, physical education would not make these its major aims because many other aspects of the school program (drama, music, school government, and classroom and committee assignments) contribute to the social objectives. It would, of course, cooperate in making efforts wherever it could to reinforce desirable behavior in this regard.

Illustrations of the things that might be seen as being unique to physical education would be concerns such as physical fitness, sports skills, exercise techniques, and intellectual awareness of the physiological and psychological effects of exercise and sports participation. It should be noted that these are only examples and should not be interpreted as being an exhaustive list of the unique concerns of physical education. The only criterion required for determining whether a given objective should be placed on the list would be that of unique and ultimate responsibility. That is, if a given individual appears to have failed in the attainment of certain objectives, *to whom can he be referred for remedial action?* If, for example, a student seems continually depressed and uncommunicative despite all efforts of the instructor, he should be referred to the school psychologist. On the other hand, where does the instructor send the youngster who is chronically low on the physical fitness scale? The fact is that there is no one (including physicians, physiologists, and therapists) who have the training and background in this area that the physical educator is expected to have. Therefore, physical fitness is classified as one of the unique objectives. The only question remaining is whether it is a sufficiently important objective to be given priority. This decision must be made on the basis of philosophical considerations.

From the preceding discussion it should be clear that if one views physical education primarily as a tool to be used in achieving overall educational goals, then its primary objectives will change whenever changes in society's educational emphasis occur. Under such conditions physical education is a process or procedure, not a discipline, and cannot logically have any objectives of its own. If, however, physical educational emphasis occur. Under such conditions physical education is ber of legitimate objectives can be established *independent* of the goals of general education. Because such goals would be oriented to the preservation of the efficiency of movement (that is, the prevention of degenerative disease, the acquisition of desirable body image, the development of certain kinesthetic appreciations, and so on), they would generally be in harmony with the aims of general education. In many cases the realization of the goals of physical education (particularly those related to physical and mental health) would be prerequisite to the pursuit of many of the socially and/or politically determined goals of general education.

Up until the present, however, it is evident that physical education has been viewed pretty much as a tool of general education in the achievement of broad, cultural goals. As a result there have been a great many changes in the emphasis of physical education both in this country and abroad.

## Opportunities in Physical Education

Physical education is an extremely broad profession frequently merging into health education programs or recreation programs. Because the programs he is equipped to direct and the objectives he is dedicated to pursuing are utilized by different organizations in a variety of settings, the competent, *well prepared* physical educator will discover that he has a choice of many professional opportunities.

The various divisions of the school structure offer a great many opportunities to the prospective professional. Physical education teachers are needed at elementary, junior high, senior high, junior college, and college levels. Elementary specialists are in increasing demand, including both men and women. Some of the most challenging and exciting work in physical education is now being conducted at the elementary school level.

The junior and senior high schools continue to provide the bulk of positions. With burgeoning populations and new construction everywhere, positions are more numerous than ever before. It should be carefully noted, however, that in some areas of the country there are more male physical educators graduated than there are positions, particularly at the secondary level. Keep in mind, however, that there is always a demand for the *good*, well prepared physical educator. This concept, involving a clearcut distinction between positions in coaching and physical education, will be amplified later. Of course positions for women at the secondary level are always available, many of them remaining unfilled for lack of applicants.

At the college level there are several kinds of professional opportunity. One of these involves teachers of skills and games. Traditional college programs usually provide opportunities for students to enroll in classes in which they can improve or maintain physical fitness levels and learn skills that will be useful to them in their post-college years. Most colleges require at least a master's degree of all teachers, and many require higher degrees.

In recent years there has been considerable interest in revising college required physical education programs to place more emphasis on the *understanding* of how physical activity, sport, and play contribute to the health and well-being of the individual. Such programs are designed to add a dimension to traditional skill and fitness-oriented programs and should not be interpreted as a substitution of intellectual activity for physical activity. Teachers in this kind of program require greater depth of training than is usually available in the master's degree curriculum. Most schools employ team teaching techniques in conducting the various aspects of such programs.

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Of course the training of future teachers of physical education requires large numbers of competent professors. Such positions almost always require a doctoral degree as well as teaching experience at other levels. In addition to professional teaching opportunities, many universities now have research specialists who have only limited teaching responsibilities and spend most of their time in research endeavors.

Other positions for which graduate work is required include administrative or supervisory positions at all levels of physical education. While coaching responsibilities are not generally regarded as requiring advanced graduate study, many colleges do not hire people for coaching responsibilities alone, and in such cases advanced degrees are mandatory.

Opportunities existing outside the schools cannot all be listed. Some of those most commonly pursued by physical educators are found in organizations such as the YMCA, YWCA, YMHA, community centers, and municipal or private clubs. Boys' clubs, hospitals, churches, industrial concerns and other agencies also frequently employ physical education specialists.

It is becoming clear that this is an age of specialization. While a broad background is always necessary for effective professional accomplishment, today's problems require an expertise that cannot be attained without specialized study. This means not only better undergraduate theoretical and technical preparation but also advanced study. Specialists are commonly employed for positions in dance, acquatics, elementary physical education and gymnastics in the public schools. At the college level specialization is even more narrow. The person who plans to make the most of his potential must strive to secure the best possible undergraduate preparation upon which to select and build a future specialty.

## OBJECTIVES OF HEALTH EDUCATION

In terms of the establishment of general objectives, health educators have (at least in recent years) achieved greater unanimity than have physical educators. Since "health" has been defined in rather specific terms, it has been relatively simple to devise objectives for the educator to pursue.

It must be emphasized, however, that the field of health education is so broad (encompassing everything from sex education to the problem of metabolic disturbance resulting from rapid time zone change in east-west air travel) that it is essential that priorities be established on the basis of importance. Since there is always basis for disagreement on relative importance of specific objectives, there is still considerable disparity among health education programs throughout the country.

Many problems have been encountered in dealing with controversial topics such as sex education, birth control, drug abuse, alcoholism, fluoridation, and smoking. It is virtually impossible to separate social issues and value judgments from such issues, yet health educators are frequently forbidden to utilize any methods other than an objective approach (if indeed,

profession comes immediately to mind, but many of the other possibilities for service in this important area are not so apparent to the student beginning his college studies. Medical sociology, physical therapy, sanitation engineering, public health nursing, hospital administration, medical technology, biostatistics, and dental hygiene are just a few examples of many health-related career opportunities. These, of course, require preparation of varying kinds and amounts not usually a part of the programs in university departments of health, physical education, and recreation. The careers for which you can prepare in such departments are more likely to directly involve education. There is a need for more well prepared health educators, public and school. The school health educator is concerned primarily with planning and conducting educational programs within the public school organization, though he certainly can promote public health education as well. Most persons trained in health education have naturally gravitated in the direction of public school teaching positions. But public health departments and agencies are more and more becoming interested in utilizing the full-time services of public health educators. They also recognize the need for more in-depth preparation of such persons, especially with regard to the scientific bases of health.

The health educator with a baccalaureate degree may also continue his professional preparation by studying for a master's degree. Those with the interest, background, and intellectual capacity can achieve a doctorate, specializing either in health-related research or in health education or both. Such professionals most often choose to affiliate themselves with colleges or universities, but there are other agencies and institutions in need of these professionals as well.

The need is apparent and the opportunities for service in the health-related professions are both great and varied.

## OBJECTIVES OF RECREATION

Like the objectives of physical education and health education, the objectives of recreation have undergone change over the years. The goals sought by each teacher will, of course, vary depending upon the people and problems with which he works.

The Commission on Goals for American Recreation has produced a statement encompassing six objectives (119).

1. Personal fulfillment. In emphasizing the importance of the individual in our society, recreation is viewed as having one outstanding purpose: to enrich the lives of people. "One approaches personal fulfillment as he narrows the gap between his potentialities and his accomplishments." The recreation leader's challenge is to provide experiences "through which the individual may enjoy success in his search for adequacy or self-esteem."
2. Democratic human relations. Since exclusive concentration on personal goals may lead to the development of

to achieve more than simply "keeping the kids off the street," however, preparation of leaders who understand the problems and know the principles involved in developing solutions requires *at least* four years of college level preparation.

## Opportunities in Recreation

Recreational opportunities, as one would expect, have expanded enormously in the past twenty years. Because so many kinds of programs are provided in communities, people with widely divergent interests may find employment in one of them.

Some of the institutions and agencies with organized recreation programs and recreation personnel are:

1. Federal, state, city, and local governmental divisions. This includes parks, schools, conservation departments, military establishments, forestry service, and welfare agencies. Federal grants are currently providing a number of extensive recreation programs.
2. Private agencies. Well-known agencies such as the YMCA, YWCA, YMHA, church-sponsored community centers, Boy Scouts, Girl Scouts, and Campfire Girls continue to require large numbers of qualified leaders. Other organizations such as private clubs, camps, and charitable organizations require leaders with training to operate camps and organize community projects.
3. Commercial agencies. Many commercial enterprises hire specialists in the organization and teaching of recreational activities. Summer resorts, bowling alleys, theaters, food specialty chains, and manufacturers of sporting goods are some of the kinds of agencies interested in recreation.
4. Industrial plants. Industrial plants have moved into the area of recreation with large programs. Frequently programs are sponsored throughout the year for the entire family of the employee. With the recognition of the fact that private industry must take a large share of responsibility for the provision of things that will assist less affluent members of our society to achieve their potential, more emphasis is likely to be placed on programs such as these.
5. School programs. It has long been evident that schools in city and suburban areas needed to become centers for more kinds of community activity. Taxpayers are beginning to insist that the vast funds expended in school construction return greater dividends in terms of more use. This means that recreation programs, not just for children but for all segments of the community, are being established in school facilities. Although school personnel may occasionally be involved in such endeavors, the programs themselves are frequently separate from the school operation, and personnel are not school teachers putting in extra hours. Such "lighted schoolhouse" programs can aid in solving the fundamental problems of providing the necessary funds to meet the needs of the community.

## Effectiveness of Recreation Programs

The evaluation of the effectiveness of recreation programs in terms of the established objectives is exceedingly

difficult. Because other factors also bear on those that the recreation professional is interested in, it is difficult to conclude just which factors produce what effects.

The new governmental programs mentioned previously, for example, utilize a great many techniques in attempting to get potentially capable youngsters prepared for college. Recreation is only one of these techniques. It is difficult to evaluate reports claiming success in teaching Spanish or geometry in Head Start programs by the incorporation of recreation techniques. Another problem is that when we begin talking about the use of recreational techniques in teaching or in obtaining some desired behavior, are we still talking about recreation? Some people feel that we are not.

It is easier to assess the effects of leadership on the kinds of programs produced and the number who participate. These kinds of research have considerable usefulness in establishing the need for capable recreation leaders. For example, a report by Chandler and Hyde (98) indicated that in an institution for elderly people, the social interaction and participation of socializing activities were dependent upon the presence of a recreation leader. His absence resulted in a 50 percent reduction in socializing behavior.

Other studies relating to health, physical fitness, social, and psychological characteristics have been reported in other sections of this book. Many of these could be regarded as being pertinent to recreation because of the kinds of activities involved.

There remains a great deal to be learned about the overall effects that recreation programs can have on our complex, confusing culture. Can the depersonalizing effects of the computer age be forstalled? Can concern and compassion be a part of a mechanized, sophisticated (sometimes cynical) society? These are only examples of the important questions that need answers.

*Play is more than a pastime, it is a fundamental tool for the discovery and rediscovery of the meaning of living. An understanding of the relationship between play and the development and fulfillment of the self is a prerequisite for effective programing. The creation of recreation theory rests upon this cornerstone (506, p. 50).*

## SUMMARY

Definitions of physical education vary significantly and are usually phrased in terms of what physical educators *do* rather than what they study. Part of the difficulty in coming to substantial agreement on primary objectives for physical education may stem from lack of agreement about what physical education really is. It has been suggested that the study of human physical activity, with all its implications, should define the limits of physical education.

Health education has had few problems of definition, but "health" as a concept has undergone considerable expansion in recent years. While separate classes in health education are found in most of the larger schools, full-time health educators are still the exception rather than the rule.

Recreation, as a career, defies precise definition, much as physical education does. Its operation is closely associated with man's leisure but is certainly not synonymous with it. The concepts of work, play, and recreation are complexly intertwined making the tasks of recreation leaders exceedingly important, as well as difficult.

Although it is not currently possible to get physical educators to agree on the *primary* objectives of physical education, the major objectives most often articulated can be placed into general categories such as: (1) organic development, (2) social development, (3) psychological development, (4) development of cognition, (5) philosophical development. The objectives most commonly stressed have fluctuated with social conditions and shifts in educational philosophy. It is suggested that the objectives most commonly pursued with greatest vigor are not necessarily the objectives of greatest importance to the welfare of the student.

Criteria for the establishment of objectives are based on philosophical considerations. The wide variety of objectives is understandable in the light of differences in philosophy within the profession. One way to simplify the problem of selection of primary objectives would be to make selections on the basis of the *uniqueness* of contributions of physical education to individuals. One problem is that this procedure ignores the establishment of priorities in terms of the relative *importance* of all possible objectives. That is, if uniqueness *alone* were used as a criterion, the matter of whether a given objective has any relevance to the needs of individuals would not even be considered. Selection of only the unique, *important* objectives again involves philosophical considerations and may narrow the scope of professional concern excessively.

The broad, basic objectives of health education have been well articulated and are widely accepted. Other problems have been encountered, however, in the matter of controversial subject matter (such as drugs, sex education, and smoking) and in the matters of exactly which techniques should be used in the pursuit of desired objectives.

Objectives of professional recreation leaders have changed considerably in recent years as social problems have multiplied. Although *primary* objectives of recreation may differ substantially from those of health education or physical education, the tools and activities used in their achievment are nearly identical with those used in the other professions. Opportunities for employment in each of the three fields are greater today than ever before. The serious nature of the problems now being faced has, however, made the quality of professional preparation an extremely important factor in securing desirable positions.

## PRINCIPLES

1. If man is viewed as an entity (as opposed to the old dualistic concept of a mind and a body), the term "physical education" becomes entirely unwieldy as a name for a discipline.

2. The boundaries of a discipline cannot be adequately defined in terms of what its professional members do. Generally, it must be described in terms of "the study of . . ." rather than "the teaching of. . . ."
3. If an overall discipline can be defined as the study of human physical activity, physical education (the teaching of concepts, skills, and techniques), would logically become the educational arm of the discipline.
4. Health, as a concept, is more than mere absence of disease; it is a state of complete physical, mental, and social well-being.
5. Political and economic conditions have resulted in the possibility of mass leisure that looms simultaneously as a potential threat and a potential blessing.
6. The fact that a given professional objective has widespread approval and practical support does *not* necessarily mean that it is more important than other less popular objectives.
7. Two distinct approaches to the problem of determining objectives to be given priority can be identified. One is to determine the needs of the student and shape objectives to fit these needs; the other is to identify the potential *unique* contributions of the discipline and structure objectives around them.

## EXPERIMENTS AND EXPERIENCES

1. Create a check sheet listing as many "possible objectives" of physical education as the class can formulate. Each class member should then rank these objectives in the order that he *believes* most accurately reflects the objectives of high school physical education programs.
2. Survey the class and determine the percentage of students who have experienced formal, classroom instruction in health (apart from that incorporated into science courses).
3. Contact all available community recreation agencies and determine the number of events sponsored that have as their objective the improved health of their members.
4. Obtain a list of facilities available for recreation in your city. Estimate the maximum number of people that could be accommodated at any one time. What implications does this have for future programs of recreation?

## SUGGESTED READINGS

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# Development and Current Status of the Professions

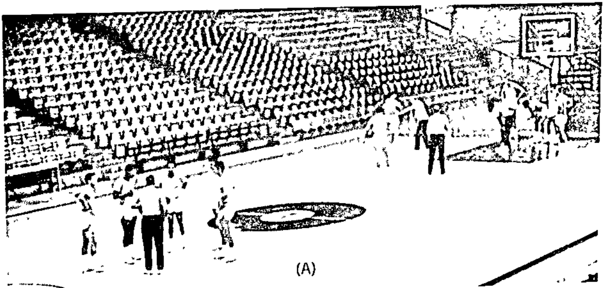
# Chapter 3

## STATUS OF PHYSICAL EDUCATION

In looking at the picture in the public schools today, it is easy to identify the major patterns followed by physical educators. Sports skills and physical fitness are obviously the two factors most commonly stressed. Furthermore, in many instances the fitness objective is applied to the great mass of students while the skills objective is vigorously pursued with only a relatively few talented performers, who are usually members of interscholastic teams. Although it is true that the skills of team and individual sports are used as the basis of the curriculum in most schools today, inadequate facilities, large classes, and other factors have resulted in programs providing very little individual evaluation and instruction for most students. On the other hand, great attention has been given to this type of instruction at the varsity level.

In very blunt terms this means that in too many schools physical education classes consist of large groups of students being turned loose in small gymnasiums to play some form of team game. Instruction is usually minimal or entirely absent.

Evaluation of student needs and progress is usually a matter of guesswork rather than objective measurement. On the other hand, varsity sports are given a great deal of attention, time, and money. The coach-player ratio is very low, and several assistants are usually available to aid the head coach.



(A)

(B)

**FIGURE 3.1** Even in the finest American school systems, the best conditions for skills instruction (as illustrated by student teacher ratio and adequacy of facilities) are provided for those who have the greatest ability. Pictured are. (A) varsity basketball players and coaches and (B) girls' physical education class and teacher.

## DEVELOPMENT OF PHYSICAL EDUCATION

As has already been pointed out, several factors in our recent history have combined to shape our present philosophies and practices in physical education, as well as health education and recreation. If you are typical of the student who is just entering one of these professions, you are more interested in considering the future than the past. For that reason a detailed discussion of the history of physical education will not be presented. But because it is helpful in many ways to understand some of the events that have led up to our present circumstances, a brief backward glance will be taken here.

Physical education as a part of the public school curriculum may well owe its existence to war. The physical survival of individuals, as well as societies, has historically depended upon the ability of men to defeat other men in physical combat. It is not surprising to find, in looking back over the years, that nations have always demanded increased fitness for their citizens whenever wars have threatened.

### PREHISTORY

If one is willing to interpret *physical education* in a very liberal way, it is possible to say that the instructions given by cave-dwelling fathers to their sons in techniques of stalking and killing game (as well as human enemies) constituted a kind of physical education. Indeed, survival depended upon swiftness of foot and strength of arm; survival of the fittest was the most fundamental of laws. Under such circumstances of daily crisis (or "war") there is no doubt that physical fitness was a state to be highly valued. Observations of this kind have only limited value, of course, because no one would suggest that there existed any kind of formalized program of education during this period.

The earliest known records of systemized instruction in exercise for purposes other than combat are those from early Egypt and surrounding regions. It is apparent that, for certain classes of people at least, skill was developed in activities such as swimming, wrestling, dancing, and gymnastics as early as 2000 B.C. Instruction in activities more directly related to combat, such as archery, riding, and boxing, was also common.

### EARLY CIVILIZATION

Although it is generally agreed that civilization developed earliest in the southern Mediterranean countries, it is also apparent that the Chinese produced a remarkable early culture. As the mystical religions of the east developed, less and less emphasis was placed on the care of the body. Because war was viewed more as a necessary evil than as a worthy pursuit of life, educational systems for the training of soldiers did not become as highly developed as in other countries. Ancient China did, however, produce a system of light exercises designed to prevent disease. This form of medical

gymnastics called *Cong Fu* combined stretching and breathing exercises and was usually performed in a sitting or kneeling position.

Examination of historical accounts of other ancient civilizations indicates that most activities that could conceivably be labeled "physical education" were generally connected either with religious rites (as with the dance) or with preparation for combat. From a recreational standpoint there have been games and pursuits such as hunting, fishing, and other activities practiced since antiquity. Some of the most ancient artifacts are toys that were used by children in their play. Ancient references to ball games of one kind or another can be found in both written accounts and art of the various periods.

## EARLY JEWISH INFLUENCE

One of the ancient cultures having most influence in the development of Western civilization was that of the Hebrew people. Whereas the great emphasis on education generally excluded anything that could really be called physical education, it is of great interest to note the fact that the religious laws provided for health practices that were far advanced over other civilizations of the time. Cleanliness in the preparation of foods, the cleansing of eating utensils, and the washing of wounds under running water anticipated many modern disease-prevention practices.

Although the ancient Hebrew people apparently had great respect for human strength and although they certainly recognized the need for training for warfare, their culture made little provision for sport or games. Whereas the influence of conquerors had, from time to time, caused Jewish communities to build stadiums or other sporting facilities, such influences were usually rejected when the domination of the conquerors ended. So, although we have derived many of our precepts about education and the responsibility of parents for the education of their children from the Hebrew tradition, little else that directly applies to physical education or modern recreational practices can be attributed to the ancient Jewish influence.

## THE GOLDEN AGE

On the other hand, one of the cultures having the greatest influence on modern practices in our profession was that of the early Greek civilization. One of the most obvious signs of this influence is that of the Olympic Games; this sporting festival originated in Greece about 776 B.C. as one of several such festivals held periodically. They achieved such importance that wars among various city-states came to a halt temporarily in order that the Olympics might be held every fourth year.

The idea of periodic international athletic competition is only one of many concepts that have been borrowed from the remarkable culture of the early Greeks. This period has been called the Golden Age because of the almost unbelievable contributions it made to the culture of man. Art, science, music, drama, philosophy, education,

commerce, agriculture, and practically every other endeavor of man received a tremendous acceleration during this period. In short, this was the birth of Western civilization.

Most of the information we have about the ancient Greeks has come to us through such accounts of life as were recorded by Homer in the *Iliad* and the *Odyssey*. Through the accounts of such heroes as Achilles and Odysseus we learn not only of the ideals valued by society but also of the educational aims and goals. The detailed accounts of the funeral games and the religious ceremonies give us a picture of a vigorous people who, even though they were in a position to make choices, apparently had no desire to lead a life of ease. We are also led to see the development of a society that placed the highest possible value on the harmonious development of all aspects of an individual's capabilities; action and wisdom were highly prized as characteristics to be equally developed. It is interesting to note that as the Greek culture evolved, it became taken for granted that every citizen had a responsibility to exercise daily in addition to other duties, including strenuous military training. The state provided gymnasiums for the use of all male citizens, and it was expected that even older men would make use of the facilities for their physical well-being. Of course, it must be remembered that cultural activities of other kinds also took place at the gymnasium, especially during the later period of that age.

It must not be assumed that aims and practices were uniform throughout ancient Greece or that these remained constant across the years. You will remember that Greece was composed of a group of city-states, each independent from the other. Athens and Sparta were two of the largest and most influential and are representative of differing attitudes toward the citizen's preparation to meet these responsibilities. Although a more detailed discussion of the philosophies involved will be found in Chapter 7, you will remember that, in general, Sparta stressed military preparedness and discipline whereas Athens was noted for its more democratic emphasis in securing the services of the individual for the state. There were other differences as well, but there were also some significant similarities.

One of the most interesting characteristics of the city-states was their belief in the involvement of citizens in the affairs of the state. This is exemplified not only in the training for fighting that was expected of every citizen but also in the fact that the citizens themselves were the participants in the games of the various festivals. Apparently nothing was more highly prized than to be the well-rounded man, a perfect balance between the man of action and the man of wisdom.

It has been said that one of the significant reasons for the great cultural accomplishments of this period was that unusual individual freedom of thought and action was coupled with individual responsibility for civic affairs. Similarly, it has been observed that this society passed its pinnacle when freedom led to individualism without a civic concern. When prestige



**FIGURE 3.2** Ancient Greece was remarkable for its equal emphasis on the perfection of physical and mental attributes. (A) Demosthenes, antique sculpture (Vatican Musuem, Rome, Alinari—Art Reference Bureau), (B) Myron's Discobolus, Roman copy after bronze original (National Museum, Rome).

became more easily obtainable through wealth and political power than through individual cultural and physical accomplishments, the strength of the city-states began to crumble. The vulnerability of Greece was further increased by the shift in concept from idealizing the man of balanced action and wisdom to idealizing the man of wisdom only.

If the story of physical education in Greece were nothing more than another example of how a young, vigorous nation rose to a position of prominence and then, through neglect of physical vitality, fell prey to another more vigorous culture, there would be little that is unique to study. In this case, however, physical activity, athletic performance, and the maintenance of physical fitness were regarded, for the first time, as something more than mere preparation for war or individual combat. There was a period at the height of the Greek civilization when education was thought to be complete only when a

man could perform as well as think. For a young man to exhibit a flabby body was to admit a deficiency in his education (see Chapter 7).

Furthermore, the esthetics of performance were highly valued. The appearance of the body was ideally to suggest a fine balance and harmony of development. The classical Greek statuary indicates the esteem in which grace and harmony were held, as opposed to muscular bulk for its own sake. It is also true that during this period the quality or appearance of the performance was regarded as highly as was the final outcome in terms of winning and losing.

With the decline in participation in games by the citizenry and the concommitant increase in professionalism, less and less emphasis was placed upon the *experience* of performing; the *outcome*, as well as the entertainment provided by the spectacle, became the important factors.

## ROMAN INFLUENCE

After the Greek civilization fell to the Macedonians, and later to the Roman Empire, much of the unique character of the Greek attitude toward physical education was lost. The Roman had no taste for the Greek tendency to involve himself in the games and contests of the many festivals. The Roman preferred to observe the giant free spectacles from the comfort of the grandstand. Furthermore, the Roman had become accustomed to the emotionally charged spectacles of bloody gladiatorial combat and brutal contests between animals as well as between men and animals. The relatively tame contests involving the throwing of the javelin or the discus had little attraction for him. And whereas he found some entertainment in observing the time honored wrestling and boxing contests of the Greeks, he found it necessary to brutalize even these. The wearing of nailed gloves and riveted fist wrappings became so popular that blows produced gory wounds and hideous permanent injury, if not death. It is little wonder that after years of observing "athletic" contests of this nature, founders of the early Christian church turned away from any consideration of physical activity or exercise as a worthwhile pursuit. The fact that many of the early Christians were slaves who might themselves be subjected to deadly mock wars or animal combat in the arena for the pleasure of the masses might well have encouraged them to emphasize the spiritual, otherworldly aspects of their religion.

Whatever the reasons, it is a fact that as the influence of Christianity grew, the legitimacy of sport and physical training declined. The glorification of the body came to be regarded as a sinful tendency to be resisted at all costs. It was during this period that the body and spirit were pictured as two separate entities constantly warring against each other. In order to elevate the spirit, and thereby come closer to God, people subjected themselves to all kinds of physical discomforts and tortures. Any suggestion during this period that man was a single organism and that the

of knowledge, to comprehend the period of nearly a thousand years of retrogression and stagnation as far as learning was concerned. Only a worldwide nuclear holocaust could approximate today the conditions prevailing at the depths of the terror-ridden Dark Ages. Under such circumstances survival is the only objective of any personal importance; cultural considerations are nonexistent.

## THE RENAISSANCE

About the tenth century, however, there were stirrings of interest in matters beyond the local level. The causes and implications of this beginning of the period known as the Renaissance cannot be discussed here, except to indicate that religion and the Church played an important part in this revival of culture. The simple fact that representatives of European areas began to venture once again into unknown lands created the conditions for exchange of knowledge, an aroused curiosity concerning other peoples, and a basis for at least a limited commerce among peoples. The crusades into the holy lands, as destructive and as poorly conceived as they often were, did contribute substantially to the rekindling of interest in learning and culture.

It was during this time that knighthood provided the only arena in which any physical education was practiced. The familiar stories of jousting and tournaments provide descriptions of the kinds of activities that young men of noble birth, at least, might hope to pursue. But it is clear that these activities were really no different than those practiced over a thousand years earlier. One significant difference, however, was the creed of chivalry that served over the years as a prominent factor in raising barbarianism to the level of civilization.

Despite the fact that the new enlightenment brought the development of universities and the congregation of young men who frequently engaged in games and sports of one kind or another, there was no official sanction or encouragement of such amusements. Gradually some of the private schools of southern Europe began to include some provision for exercise and recreation. In most others, however, such activities were either ignored or frowned upon by educators of the day.

This is not to say that there was not considerable interest in sporting activities during the Renaissance. Fencing masters were in great demand among the wealthier segments of society. Bowling on the green, tennis, and dancing, as well as other spectator amusements, were very popular. In an era when courtliness and good manners were stressed, many of these activities were considered indispensable means of promoting proper carriage and grace. All this was in addition to the time-honored practices of riding, wrestling, swimming, shooting, and other combat-related activities.

As the renewed interest in learning progressed, it was accompanied by a great social and political upheaval. Dis-

satisfaction with punitive economic practices spelled the collapse of feudalism, just as revolt against religious despotism resulted in far-reaching political and religious reforms. And although the Protestant reformation led to the creation of many denominations and sects, it did not produce greater religious tolerance. Conflict and persecution were responsible in a large measure for the establishment of colonies in the lands newly discovered by those who were seeking new trade routes. The hard work and privation required for survival in frontier settlements combined with religious doctrines (that tended to brand as sinful any form of recreation) to effectively prevent acceptance of physical education as a part of the school curriculum in the New World, as well as throughout much of the Old World. Social events were generally built around one of two legitimate activities: worship or work. Any activities that might be termed recreational needed to have some productive purpose such as that provided by quilting bees, house raising, or harvest contests. Even the natural playfulness of children was considered frivolous activity that must be curbed as early as possible.

## THE ENLIGHTENMENT

In the seventeenth century it was the rule rather than the exception to regard children as being little adults. In this kind of atmosphere it is not surprising that little thought was given to needs for physical education in the school programs of the day. There were those, however, who were strongly opposed to this philosophy. One of the best known of the so-called naturalists, who led the philosophical revolt against the practices in the eighteenth century, was Jean Jacques Rousseau. This noted French philosopher meticulously outlined an educational program that gave great emphasis to the development of physical stamina, strength, and coordination. The concept that it was a *human being* that was to be educated rather than a *mind* (as distinct from a body) was in direct opposition to the then current beliefs and practices.

Although Rousseau's ideas were tried in only a few private schools of his day, the ideas did not die. As cultural climates became more amenable to ideas of individualism, his concepts and others of similar direction came to be included in the design of curricula in various countries.

However, it was only through a long, complex series of social changes, including wars, political upheavals, philosophical and scientific advancement that physical education became an integral part of any educational system. As always, preparation for war continued to be one of the strong motivating forces for the inclusion of physical education in the school programs. This factor alone, however, seldom seemed sufficient for the justification of its inclusion. In most nations the increased awareness of the necessity for adequate exercise in the optimum development of children was an important consideration.

## EUROPEAN SYSTEMS

Germany and Sweden are the two countries that come to mind most readily whenever early programs of physical education in the schools are discussed. Out of Germany evolved gymnastics oriented to the use of so-called heavy apparatus such as parallel bars and vaulting horses. Friedrich Ludwig Jahn and, later, Adolph Speiss were responsible for development of much of the German System. Swedish gymnastics, largely attributed to Per Henrik Ling, were performed in conjunction with balance beams, stall bars, and other equipment of a "lighter" nature. Elaborate progressions and stipulations of proper form for the performance of exercises in both systems were painstakingly developed by their respective proponents.

At about this same period of the nineteenth century, the "public" schools of England were developing their own approach to physical education. These schools (which, despite their name, were maintained for the benefit of the aristocratic families only) stressed classical studies of language and literature as well as some science. In addition to these studies, the boys participated in a growing number of individual and team sports and games. Tennis, swimming, boxing, soccer, cricket, boating, and other activities became extremely popular at these institutions. Administrators of these schools encouraged this kind of participation not only for the physical fitness values they provided but also for the qualities of leadership, perseverence, and sportsmanship that they were believed to promote. It is noteworthy that despite efforts to popularize the formal European gymnastics programs in England, the populace never accepted them with the enthusiasm that they retained for their sports and games.

Today, as we look around the globe at the various systems of physical education as they are currently practiced, we can see clearly the influence of the three systems just discussed. The intensely competitive colonization not only expanded empires but also carried cultural influences, such as these favored systems of physical education, to many parts of the world.

Of course, the cultures into which systems were introduced determined whether they would be successful in meeting the needs and desires of the people of the culture involved. In America, for example, both the Swedish and German systems were introduced into the school systems at approximately the same time; both enjoyed some success. It is apparent today, however, that the predominant influence in American schools is that derived from the British society. It is clear that the nature of a people combines with prevailing economic and political conditions to produce educational practices. The United States has adopted a blend of the European systems to which it has added its own unique modifications. This is not to say that there is any such thing as a *national* curriculum in physical education. Surely many regional and local variations persist, both in regard to type of activity and quality of program. Generally speaking,

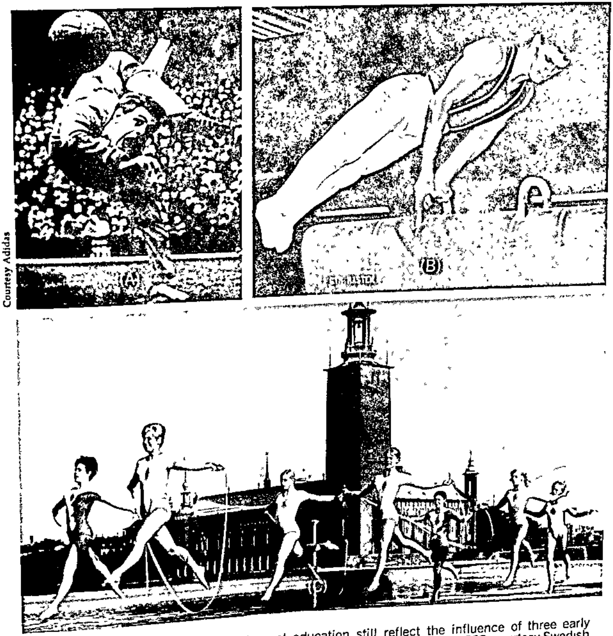



**FIGURE 3.3** Modern programs of physical education still reflect the influence of three early systems: (A) English, (B) German, and (C) Swedish, picturing the Sofia Girls, 1968, courtesy Swedish Information Service.

however, programs of physical education in this country are built around the sports-and-games concept. Criticisms regarding the alleged inadequacy of such programs for the building of adequate fitness levels have been met by the addition of more formal types of activity to existing programs, in most cases, rather than a change in emphasis and replacement by activities designed strictly for the development of physical fitness.

## TODAY'S PHYSICAL EDUCATION

If we discount the remarkable culture of the early Greeks, we can see that physical education is really a very recent development in man's history. When we stop to consider that the earliest systems of physical education were introduced into the schools only about 150 years ago (and less than 100 years ago in the United States), it is apparent that we are dealing with a very young aspect of education. When we then look at the changes that have occurred in the world within the last 100 years as compared with all that have gone before, it is not surprising that there are differences of opinion about what the main purpose of physical education should be in America and the world.

### THE FUTURE

There is little doubt that the next ten years will be critical ones for physical education in the United States. We will be facing problems that man has never before encountered. The role that physical education is to play in the lives of people will be determined by a great many factors, including social preferences, educational aims, economic goals and conditions, and political pressures. If our profession is to survive and emerge as a truly positive contributor to the welfare of mankind, physical educators themselves must become aware of:

1. The ways in which physical activity affects man and his environment
2. The ways in which man and his environment limit, encourage, and generally affect human physical activity

## CURRENT STATUS OF HEALTH EDUCATION

When we address ourselves to the question, "Where is health education today?" we naturally turn our thoughts to the questions: "Where were we?" and "How long has it been since we were there?" Investigation leads to two somewhat striking answers to the latter questions: "It was awfully dark and bleak where we were and it has been less than a hundred years since we were there." To put it another way, health education is "young," and it has grown and developed tremendously since its earliest beginnings about 1870, when it was nothing more than a temperance and antivice program with some anatomy, physiology, and hygiene thrown in for good measure.

### EARLY PRACTICES

Ancient societies, including the Chinese, Egyptians, Hebrews, Greeks, and Romans, including a period from about 3000 B.C. to A.D. 1700, were concerned to some extent about physical well-being and stressed certain rules for hygienic living. Emphasis was placed most commonly upon "physical" health and well-being and the absence of disease. Horace Mann, in 1840, stressed the importance of physical well-being and "educating for health," (188, p. 14)

but was largely ignored. The public health movement in the United States began in 1850. At that time city governments began to establish and upgrade health departments as a direct result of Lemuel Shattuck's *Report of the Sanitary Commission of Massachusetts* (188, 223). In this report, Shattuck described a modern program of public health—especially preventive programs—and gave impetus to the idea that health was more than absence of disease. Perhaps of even greater importance were his suggestions for *health education.*

Ohio instituted a state program in 1872; it was typical of those instituted from that time until about 1918 in that it was "anti-vice and function-of-the-body" oriented as a result of the powerful temperance-sponsored propaganda movement. Health as it is now conceived was not emphasized until sometime after World War II.

We can approximate the progress of health education from the early 1930s to the present by perusal of several typical health texts for college students. Williams' (609) fourth edition of *Personal Hygiene Applied,* for example, was published in 1931 and included several chapters on the meaning of health, the health problem, man in society, the approach to health knowledge, and science and attitudes, all apparently directed at setting the mood for effective learning. The remainder of the text was devoted to "the hygiene of" each of the major systems of the body and to nutrition, the mouth, eye and ear, and "sexual aspects of life." One chapter was devoted to "prevention of specific diseases." Hygiene and the study of body function was still in vogue in 1931, but *eleven* small-size pages were devoted to some sex education!

By the mid 1950s there was less emphasis on the systems of the body per se. See, for example, Kilander's *Health for Modern Living* (310). Personality and mental health, dating, courtship and marriage, growth and development, nutrition and weight control, relaxation and recreation, study of stimulants and depressants, alcohol and tobacco, more extensive treatment of disease, planning medical protection, and national health resources were now typical of health education content.

## TODAY'S HEALTH EDUCATION

In the mid 1960s we apparently had returned to some emphasis on the function of the body's system per se and some effort at defining the importance of health education. In Miller and Burt's *Good Health* (390) we see that physical fitness was added and that there was more extensive treatment of sexuality and reproduction. Family planning appeared, and strong emphasis on problems related to tobacco, alcohol, and narcotics was continued. Consumer health appeared on the scene, as did greater emphasis on *community* health and personal appearance. Some coverage of emergency first-aid procedures and a discussion of radiation dangers were also included.

Another development has been health education's recent trend in the

direction of the conceptual or "big ideas" approach to learning. Perhaps it is too early to call this a trend, but considerable time and money was spent on the development of a conceptual model for school health education, and it appears most likely that the approach will be more and more utilized. The approach is based on the precept that the "big ideas" or basic concepts are better retained and assimilated than are facts. There are three key concepts: growing and developing, decision making, and interactions. The new terminology may be somewhat misleading, but when we turn to the ten concepts subsumed by the three key concepts, the picture becomes clearer. These ten concepts are listed in Table 3.1. Categorized under each of the ten concepts there are from two to four substantive elements, a total of thirty-one of these in all. The curriculum then is organized around these substantive elements in terms of goals for the learner and behavioral outcomes at a particular developmental or grade level.

There is yet another bit of evidence that leads one to believe some health educators have awakened. The *ideal* approach is no longer viewed as the textbook and lecture method; there are problem solving and experiments (as well as the older movie-film, posters, pictures and television methods). Although the idealistic new programs are not yet widely being used, the fact that they are being utilized at all is encouraging.

## THE FUTURE

As a final note and fitting close to the discussion of the question, "Where is health education?", let us say "not where it *has* been (fortunately!) but not yet where it can be." To be sure, there are encouraging signs as we have pointed out. But every school does not yet teach health as it should be taught (too many still do not teach it at all); and the

**TABLE 3.1 Ten Concepts for Health Education**

| |
|---|
| Growth and development influences and is influenced by the structure and functioning of the individual. |
| Growing and developing follows a predictable sequence, yet is unique for each individual. |
| Protection and promotion of health is an individual, community, and international responsibility. |
| The potential for hazards and accidents exists, whatever the environment. |
| There are reciprocal relationships involving man, disease, and environment. |
| The family serves to perpetuate man and to fulfill certain health needs. |
| Personal health practices are affected by a complexity of forces, often conflicting. |
| Utilization of health information, products, and services is guided by values and perceptions. |
| Uses of substances that modify mood and behavior arise from a variety of motivations. |
| Food selection and eating patterns are determined by physical, social, mental, economic, and cultural factors. |

SOURCE Health Education. A Conceptual Approach to Curriculum Design. Washington, D.C., School Health Study, 1967, p. 20

conceptual model is still just that—a *model*; the test is yet to come—can and *will* these dynamic new ideas in health education be utilized effectively?

## THE DEVELOPMENT OF RECREATION

### EARLY BEGINNINGS

The concern over the problem of learning to deal with leisure has sprung from several sources. Americans tend to believe that the phenomenon of free time is unique to the modern, industrialized societies. You may recall that the ancient Greeks (and the Egyptians before them) had a great many festival days during the year and that the Romans are reputed to have had nearly as many holidays as workdays. It is generally conceded that the failure to wisely utilize this time was a contributing factor to the downfall of the Roman empire.

Of course, festivals and religious holidays are only one means of assessing the degree of recreation engaged in by ancient societies. There is no doubt that man has always been compelled to play. "Abolish religion and recreation from the face of the earth and within two moons they would return again" (72, p. 106). Both of these activities involving man's attempts at self-fulfillment and search for meaning have played significant roles in the development of civilization. Recreation is a means of dealing with boredom, and it is clear that much of the leisure of man has been spent in imaginative ways of meeting challenges presented to him by his culture.

Although recreational pursuits must have persisted among common people during the Dark Ages, the available records concerning such activity deal only with royalty and Church figures. The Renaissance produced another kind of activity to be utilized during leisure, that of learning. It was during and after the Reformation, however, that the roots of the "evils of idleness" idea took hold.

The period of colonialization carried cultures of established societies throughout the world. Religious differences provided the impetus for many of the early settlers to leave Europe, and some of the persecuted groups colonizing the inhospitable new lands developed attitudes that have had profound effects on succeeding generations.

### ATTITUDES TOWARD PLAY

One of the most enduring of these attitudes was that developed concerning work. Any unproductive activity was deemed sinful. Because play and other recreational activities were obviously unproductive, they were equated with the sins of idleness and sloth and were firmly discouraged. Many of the recreational activities of that time were "disguised" by the addition of a work element. Husking bees, barn raisings, and similar events became events to look forward to with great anticipation. Even though the harsh environmental conditions were gradually controlled, the Puritan "work ethic" persisted,

and its influence spread throughout the early United States.

It is of considerable interest to note the relationship between recreation and the Church during this time. Although "play" was not permitted (or was frowned upon, at least) the religious activities became extremely popular. Lonely settlers came great distances to attend evangelistic meetings in tents or cleared areas. Accounts of these services give an indication of the extent to which religion, in a sense, became a substitute for recreation (161, p. 80).

It was not until the Industrial Revolution, however, that the American citizen (as well as the European) began to learn what leisure meant. Less time was required to meet the requirements of life, and more money became available for recreational use. The expansion of business opportunities, however, became almost a "game" in itself. Because work had always been a legitimate outlet for one's energies, the excitement of commercial competition, getting and spending, attracted the attention of many.

The money produced by this rush of business activity, associated with the growth of cities around industrial complexes, made possible the development of "spectating." Horse racing, professional foot racing, boat racing, and other types of competition attracted large throngs of spectators, frequently taxing the capacities of transportation and housing facilities. "Phineas T. Barnum of circus fame stands out as the leading figure of this period in amusing the populace. No struggle between dramatic standards and popular taste ever troubled the master showman of them all. He was not one whit interested in art; he was interested in entertainment" (161, p. 122). Barnum's ability to provide a vast variety of entertainment for the people of the 1850s may have had a significant effect on their readiness to pay for the opportunity of viewing athletic teams compete.

The first recorded football game between colleges was played in 1869 between Princeton and Rutgers. Three games were played, and there were twenty-five players on each side. It took a few years for the game to catch on (it was banned because of increasing roughness), but after some rules changes and after further exposure, the groundwork was laid for the establishment of rivalries that have since attracted millions of spectators.

The growth of sports not only provided people a chance to observe and to be entertained but also gave them new outlets for involvement and participation. In addition to these, activities such as bicycling and then "joy riding" in automobiles provided opportunities for fun and excitement that are still enjoyed today.

## MODERN LEISURE

The changes of the first half of the twentieth century are of little interest to the youngster who has never known anything but television, supersonic aircraft, and computer technology. He will be interested, however, in the effect that the changes produced in

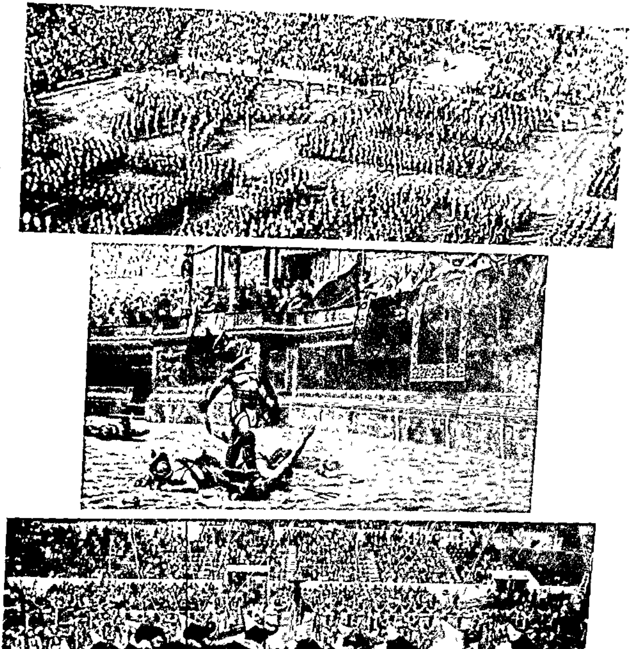


**FIGURE 3.4** Modern man is little different from his predecessors in his love for the diversion and entertainment provided by colorful and violent spectacles. (*Top, half-time entertainment at college football game; center, "Pollice Verso," 1874, by Jean Leon Gerôme, now in Phoenix Art Museum, Phoenix, Arizona; bottom, Ringling Bros. and Barnum & Bailey Circus photograph.*)

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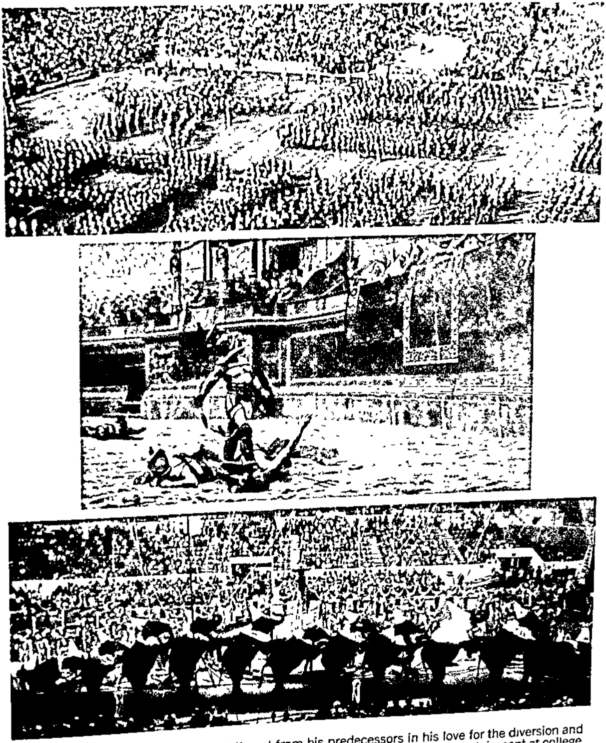

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society by automation will cause in his personal life. It is precisely this kind of problem that the professional recreation worker will be trying to help solve.

## THE FUTURE

In justifying the need for recreational leaders and recreational programs, authorities point to a number of factors of which we are all basically aware. The forty-hour work week may be reduced to thirty within the next ten years. Increased wages and the guaranteed annual wage (which has become a reality for more and more people) coupled with an unprecedented production have increased the spending power of millions. Unemployment rates have seasonal fluctuations, but unemployment insurance helps to reduce the difficulties encountered during such times. The population explosion has created a housing and a school crisis in the cities. The burgeoning social expectations of minority groups have produced a restlessness and a social mobility that is unprecedented in the history of the world. The combination of increased leisure, more money, and unfulfilled expectations is expected to produce social and economic problems whose solutions will require the dedicated efforts of a great many people. We can expect increased concern on the part of government and industry as well, and not always on the basis of objective humanitarianism. Concerning the relationships of recreation to the economy, *Fortune Magazine* reported: "The leisure market may become the dynamic component of the whole economy" (161, p. 393). In reviewing publications of the amounts spent by Americans for equipment and services related to recreation (such as the *Life* article, "A $40 Billion Bill Just for Fun"), Dulles came to the conclusion that "Play had to be considered a virtue for the sake of the nation's prosperity" (161, p. 392).

### Work and Play Today

As a consequence of the factors that have been mentioned (as well as others), the concepts of "work" and "play" in our society have undergone curious changes. This change is pointed out in Chapter 17 in terms of the implications it has for physical education in the schools. It has just as serious implications for nearly all other professions.

After reviewing the research in this area, Sessoms notes:

> *Traditionally, Western man has viewed work as the major determinator of social status, but with advanced technology and mechanization, work is losing its social importance. Increasingly . . . leisure has replaced work as life's central interest.*
>
> *For many, it is not an easy transition. There are feelings of guilt and shame; leisure has been for too long synonymous with idleness, and the prestige ascribed to adult play is woefully low. Work may not be meaninfgul but neither may be leisure (506, p. 44).*

". . . neither may be leisure"—this is the problem that faces the prospective recreation professional. The task

tion can be conveniently traced by examination of the content of popular health texts from the early 1930s up to the present time. Recent years have seen a great expansion in breadth of health topics as well as intensified interest in new and more effective ways of making health knowledge a meaningful factor in human behavior.

The history of recreation is as old as play itself. From a formal standpoint, however, the festivals of ancient peoples give us our first glimpse of organized recreation. Physical education and recreation suffered common fates during the Dark Ages and the succeeding years. Religion played a large part in formulating attitudes toward work and play, with the latter being, for a time, practically equated with sin.

The Industrial Revolution, accompanied by economic development and increased leisure, gave birth to an upsurge in recreational interest and activity. In the United States, these conditions contributed to a tremendously increased interest in spectator sports. Modern automation has only accelerated the trend to greater economic growth accompanied by increased leisure. The concepts of work, play, fun, job have become less and less clear as profound cultural changes have occurred with increasing rapidity.

Heavy responsibility for helping to create new value systems for an age of leisure rests with today's recreation personnel. The significance of recreation in American life within the next few years can scarcely be overemphasized.

## PRINCIPLES

1. Attitudes of a populace toward the concepts of work, play, leisure, and recreation have profound effects upon the vitality and direction of the society.
2. Failure to utilize free time in a meaningful, satisfying way can contribute substantially to the decay of an otherwise sophisticated society.
3. Historically, concern for the physical fitness of any population has been linked to the objective of military preparedness.
4. Physical education takes on profoundly different values when viewed from the standpoint of dualism (mind versus body) as opposed to monism (a single, unitary being).

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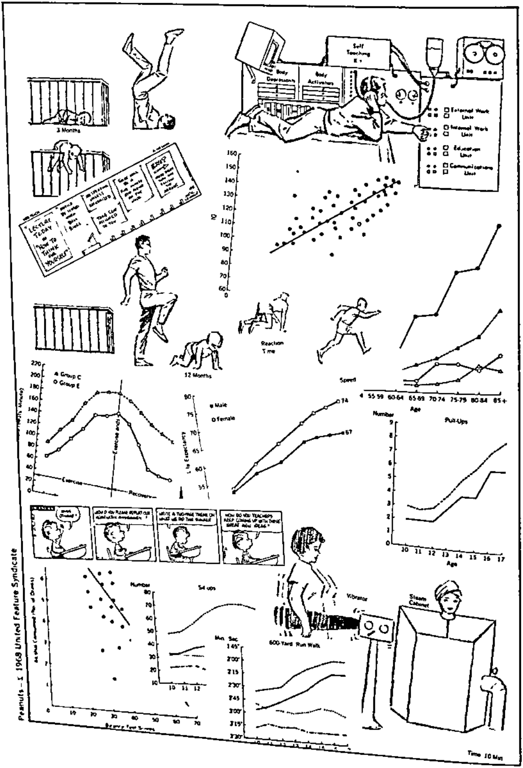


Self Teaching
Body Depressions
Body Activators
External Work Unit
Internal Work Unit
Education Unit
Communications Unit
3 Months
12 Months
Reaction Time
Speed
Age
IQ
Group C
Group E
Exercise
Exercise ends
Recovery
Male
Female
Life Expectancy
Number
Pull-Ups
600-Yard Run Walk
Vibrator
Steam Cabinet
Time 10 Min
Peanuts-1 1968 United Feature Syndicate

# *PART II*

# Essential Understandings

# Critical, Systematic Thinking

## Chapter 4

The "Miss Peach" cartoon (Figure 4.1) says it. Our experience with college students says it. Students say it, and some have started to rebel against its repression. Some educators are enough concerned about it to try to do something about it. We have attempted to do something about it in our own classes. This book is an attempt to do something about it. What is "it"? "It" is the need for developing an atmosphere for creativity and critical, systematic thinking. Unfortunately, our educational system has for years promoted just the opposite: conformism and regimented, "Polly-parrot learning." Fortunately, formal education has never been 100 percent successful in converting all of its products to conformist automatons incapable of critical and creative thinking. But, in our opinion, it has been far too successful. We see an effort in many schools to get away from this kind of "education," which is really more like indoctrination. You are fortunate if you have come up through a system of schools where the problem-solving approach to education is in vogue or at least present to some degree. If you are not so fortunate, you will have to go through some kind of a conversion process. It can be a painless con-

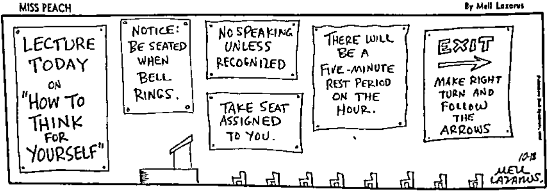



FIGURE 4.1 Miss Peach by Mell Lazarus © Field Enterprises Inc.

version because it would seem to us to be more in keeping with the nature of man to wish to be his own master, so to speak, and not to be an automaton. Perhaps not. Perhaps all persons are not built of such stuff. But it can be said with certainty that only the ones who can think creatively and objectively and who can use the problem-solving scientific process will be the true professionals in our fields (see page 12). The rest will be technicians; for the ability to think systematically, critically, and creatively is the earmark of the professional. The professional *can think effectively for himself. He can make decisions.*

## PROBLEM SOLVING AND DECISION MAKING

You have already learned something about making decisions. Although technically there may be little difference between making a simple "choice" and making a "decision," the difference is essentially one of the stakes involved. Thus, it may be relatively simple to choose which shoes one will wear with a particular suit but quite another matter to decide on whether to pursue a career in engineering, medicine, or education. Choice is often based on whim or fancy; wise decisions are based on facts.

As society becomes more and more complex, the range of decisions one is called upon to make increases. Thus, it has become necessary to develop ways of insuring that wise decisions are made. In business and government, when the stakes are high, complex and technical systems have been developed to aid in the process of decision making. The laws of probability have been utilized by the statistician and a whole field of study called "decision theory" has been born. Although the ordinary citizen does not have at his disposal the resources of industry, he can adapt the basic ideas successfully employed there to make appropriate decisions in his own life. It is important that we understand the scientific principles that can be applied to the problem of making sensible decisions.

normal healthy person is the result of the balance between caloric intake and energy expenditure.

One obvious course of action in this case is simply to reduce caloric intake to an appropriate level and to attempt to maintain weight by diet control. This, of course, implies the necessity of enduring moderate levels of chronic hunger, possibly for the balance of his lifetime. On the other hand, an increase in energy expenditure should aid in the reduction of excess weight. Mr. X reasons that because he has not changed his dietary habits since college days his weight problem must be the result of the reduced level of physical activity inherent in his occupation. He hypothesizes, therefore, that if he compromises by increasing his level of activity by playing handball or tennis three times a week and by reducing his caloric intake moderately, he should be able to regain and maintain a more desirable weight and still enjoy a sense of fulfillment at the dinner table.

(It should be noted that there are other possible courses of action open to Mr. X, all dependent, of course, on the approval of his physician. One possibility might be to change the composition of his diet from predominately carbohydrates to proteins. Another might involve the use of appetite-inhibiting drugs or the institution of a series of starvation diets. In this case, however, he has selected the elements that seem to be most advantageous to him and has manipulated them into a pattern he plans to test.)

Once under way, Mr. X keeps a regular weight chart in order to assess his progress. At the end of six months he discovers that he has lost eight pounds and has suffered no discomfort. In addition, the bulge around the middle has nearly disappeared. At the end of a year he finds that he has slightly exceeded his goal and that his weight-loss pattern has leveled off. His hypothesis has been proved to be true and his problem has been solved.

Other examples of the scientific problem-solving approach could be given, but they are all based upon the same general considerations. The single, most important step in the whole process is the formulation of an appropriate hypothesis. When knowledge of underlying conditions is limited, it is, of course, difficult to visualize other courses of action. It has been observed that "a proper construction of the question is often half of its solution." But in order to "phrase the question," or sometimes even before one can recognize that he *has* a specific problem, it is necessary to have some understanding of the basic facts. In terms of individual health and physical fitness it is important to know, for example, what the relationships are between physical activity and caloric balance. One needs to understand how the human machinery utilizes its fuel and how it responds to various changes in grade and amount of fuel.

For the solution of other kinds of problems relating to individual welfare it is necessary to be acquainted with certain other basic facts about how the body works, not only as a biological machine but also as a *person*, an integrated human being with needs,

desires, aspirations, hopes, and fears. This is not to say that one must become a physician or a psychiatrist, but only that it is important that we all become acquainted with certain basic things about how we work and think and learn.

Merely possessing this knowledge is, of course, not enough. It takes a little creativity, a willingness to manipulate and examine the facts in order to be able to come up with a properly phrased question—a productive hypothesis.

## ACQUIRING DECISION-MAKING ABILITY

In order to develop this ability to make intelligent decisions based on facts and knowledge of the process, practice is necessary. No one is born with the knowledge of how to solve his own (or anyone else's) problems. This is a task that takes practice just as any skill requires practice if improvement is to take place. For this reason you should take the opportunity to experiment with some particular problem as it relates to your own health and fitness. You will need to give attention to the techniques of observing the available information, formulating your hypothesis and collecting and analyzing your data. You will also need to learn how to avoid certain errors in drawing conclusions, and, finally, you should use your imagination in the general application of your findings.

It should be apparent that the decision-making process just described in no way rules out individual human judgment. On the contrary, it simply harnesses it and provides it with much more favorable operating conditions.

The steps used in this "do it yourself" approach are simple. First, be aware of the general problem to be studied. Next, hypothesize about the outcome of the experiment: What do you think the results will be? You will then engage in the actual collection of data, which you will then need to organize in a meaningful manner. This usually involves drawing a picture of the results in the form of a graph, as well as organizing the data into chart form. When more than one person is involved you will also want to convert the performances of individuals into a single mean or average performance. Following this you should be able to look back at your original hypothesis or theory and decide whether or not it has been supported. Finally, you should make some judgments about whether your findings have any practical or general application.

There is an infinite number of examples of situations in physical education, health education, and recreation that require "decision making in the face of facts." Some problems are obvious and *require* some kind of decision before any appropriate action can be taken. Others result from the professional's dissatisfaction with the status quo or his curiosity about a better way to do something or concern about whether his students are really learning. Listed below are some hypothetical examples of each kind of problem the professional may face.

### OBVIOUS PROBLEMS

There are too many serious injuries in our intramural touch football program.

An alarming percentage of our sophomores are contracting venereal disease.

Attendance in our recreation program has dropped off 42 percent in the last month.

A certain ninth-grade student has suddenly stopped dressing for physical education class without apparent reason.

Students have asked for a program in sex education but parents have a negative attitude.

Our community has a heart disease death rate and a mental illness frequency that are well above even the national averages.

### SILENT PROBLEMS

Are my students really assimilating the important health concepts? If not, how can I improve my program to that end?

Is each of my students as physically fit as he or she can be? If not, why not? Then, what can I do to motivate them to improve within their individual capacities?

Is there a better method than my current one of teaching swimming skills?

Is my recreation program really meeting community needs?

Are my basketball players properly conditioned, or is there a better way than I am currently using?

Does regular exercise cause changes in the heart muscle that make it more resistant to coronary artery disease?

These are but a few examples. How would you go about solving these problems or answering these questions? You can certainly add many, many more.

The general pattern for decision making can be applied in every case, but creativity will be required to select the specific approach that best fits the particular problem. Some will involve experimental research, others will require only an appraisal of the *existing* situation. But each involves the basic pattern: recognition and identification of the problem (which may involve preliminary observations and/or data collection); a formulation of an hypothesis; testing of the hypothesis by appropriate means (collection of data, experimentation); drawing conclusions and making a decision.

## REPORTING EXPERIMENTAL DATA

As an illustration of how experimental research data are commonly reported, a simple experiment, performed during a class period, is presented. A simplified version of the format used by many scientific journals is used as the model.

### AN EXPERIMENT IN HUMAN STRENGTH

I. Purpose: The purpose of this experiment was to observe the relationship between isotonic strength and isometric strength.

II. Hypothesis: The original hypothesis was that isometric strength should be found to be greater than isotonic strength.

III. Procedure: Six student volunteers

were selected from a class. Students were tested singly and were not permitted to observe each other's performance.

A. Isometric test. Each student, in turn, was required to stand with his back against the wall and his feet on a low platform about eight inches from the wall. A five-foot bar was placed in his hands (palms up) after the elbows were flexed to a measured angle of 90°. A chain and cable arrangement extended from the center of the bar to a spot on the platform directly between the ankles of the subject.

   Each subject was asked to make a maximal attempt at further flexing the elbows. The tension produced in the cable under these circumstances was measured by means of a cable tensiometer. Results were recorded to the nearest pound.

B. Isotonic test. The subject assumed a position similar to that described above; the maximum amount of weight (to the nearest five pounds) that each subject could "curl" from thighs to chest was determined. A series of trials with approximately five minutes of rest between each trial was instituted to determine maximal isotonic strength (the greatest load that could be curled *one time*). The first attempt was made with 60 percent of the maximal isometric performance placed on the bar. For subsequent trials, adjustments were made in increments of five pounds. All subjects' maximums were determined within four trials.

IV. Limitations: The small number of subjects was a limiting factor in this study. The order of presentation of the exercise tasks may have produced a fatigue effect which may have distorted the results.

V. Results and Discussion:

A. Results. The raw scores of each individual are shown in the table below.

| SUBJECT | STRENGTH ISOMETRIC | ISOTONIC |
|---|---|---|
| 1 | 72 | 45 |
| 2 | 90 | 60 |
| 3 | 103 | 75 |
| 4 | 85 | 60 |
| 5 | 60 | 35 |
| 6 | 70 | 45 |
| Total | 480 | 320 |
| Average | 80 | 53 |

The graph in Figure 4.1 shows a comparison of isometric and isotonic strength. The mean isometric strength was found to be eighty pounds, whereas the mean isotonic strength was fifty-three pounds.

B. Discussion. The apparent difference may be due to the fact that the angle of attachment of the biceps muscle to the bone is very efficient at 90° but progressively less efficient in either direction from this position. Thus, moving the bar bell

through the full range, which begins at about 180°, where the angle of attachment is less efficient, is more difficult than exerting force at the single point of the relatively ideal 90° of elbow flexion.

VI. Conclusions and Implications: On the basis of the data *collected in this experiment* the following conclusions are drawn:
1. It appears that isometric strength is greater than isotonic strength, at least at 90° elbow flexion. It is possible that at other angles, isometric strength could be less than isotonic.
2. Under these conditions the isotonic strength would appear to be approximately 68 percent of the isometric strength.

It might be implied from this experiment that it is possible to exert more force through muscle contraction in slow movements than in more rapid ones.

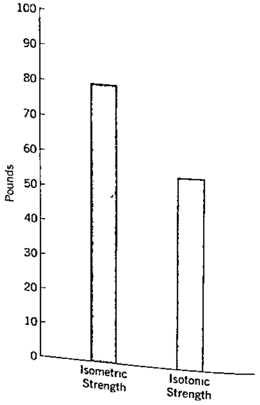
## CONSTRUCTING AND INTERPRETING GRAPHS

In the sample experiment above, a simple graph was used to illustrate the experimental findings. In this book, one of the techniques for facilitating your understanding of health and fitness information will be simply to present a table or graph that is self-explanatory and is not discussed at length. Despite the fact that graphs are widely used in popular magazines, newspapers, and books, many of us are not really graph-oriented. In order to assist those who have difficulty in interpreting graphic materials, several examples are presented below.

### THE BAR GRAPH

One of the simplest and most effective graphs for showing comparisons between groups or individuals is the bar graph. As shown in Figure 4.2, the message conveyed by such graphs is easily grasped. Here the average isometric strength of six men (eight pounds) is

FIGURE 4.2 A comparison of the means of the maximal isotonic and maximal isometric strength of six men.



represented by the bar labeled "Isometric Strength." The other bar represents maximal "Isotonic Strength," and extends upward until a value of fifty-three pounds is reached on the vertical scale.

In order to make the discussion of all graphs more simple, certain terms have been adopted to make communication easier. For example, the vertical scale on all graphs is called the *ordinate*. The horizontal scale is called the *abscissa*. Traditionally, the lowest or poorest scores of values begin at the bottom of the ordinate. When such a scale is used on the abscissa, the low values are placed at the extreme left and the high values at the right.

## THE LINE GRAPH

The line graph is another device commonly used to show changes in status. Here changes taking place over a period of time can be conveniently illustrated, as shown by the acceleration of the heart rates of the two groups shown in Figure 4.3. As can be seen, the average heart rate of the twelve men in Group E was 82 before the exercise began. As soon as they started walking on the treadmill, the heart rate began to increase. As the exercise progressed, the heart rate rose to a maximum of 160 beats a minute, where it leveled off and remained until the exercise was terminated. It can be seen that as soon as the exercise stopped the heart rates of both groups began to drop back toward normal. It should also be noted that the average heart rates of the men in Group E did not rise as high as shown for those in Group C, and also that Group E returned to normal more quickly than did Group C. In observing a plot like this we might conclude

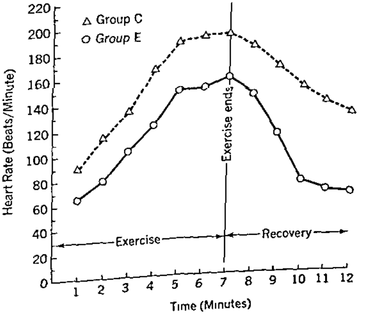



FIGURE 4.3 Mean heart rate responses to exercise of two groups of twelve men.

that the men in Group E were in better condition than those in Group C because they performed the standard task with less effort (as indicated by lower heart rates) and recovered from the exertion more quickly.

## THE CORRELATION PLOT

A device frequently used to illustrate the degree to which separate qualities are related is the correlation plot or scattergram. If we were interested in the relationship between IQ and academic success, for example, each individual in our study would need to have two scores: an IQ score and a cumulative grade point average. By arranging the possible IQ scores from low to high on the ordinate of the graph, and the academic achievement scores in the same manner on the abscissa, each individual can be represented by a single point on the scattergram. As shown in Figure 4.4, an individual with an IQ of 122 and a grade point average of 3.2 would be placed as indicated by the open dot. The solid dots all represent other individuals.

These questions now arise: Are IQ scores and grade point averages related, and if so, how closely? And is this relationship positive or negative?

It should be evident that if grade point averages went up one unit for every increased IQ unit, we would have a perfect positive relationship. All points would lie along one line and this line would form a 45° angle with either the ordinate (vertical scale) or the abscissa (horizontal scale). This would be a perfect positive correlation represented by a correlation coefficient of 1.0. Figure 4.5 illustrates such a correlation, indicating that academic achieve-

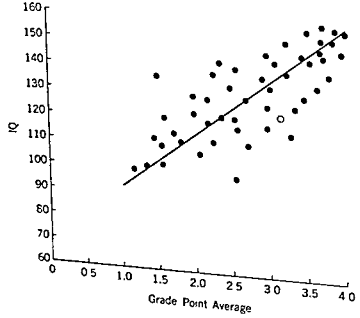



FIGURE 4 4 A scattergram comparison (correlation plot) of IQ and grade point average indicating the line of best fit. Open dot represents a student with IQ of 122 and grade point average of 3 2.

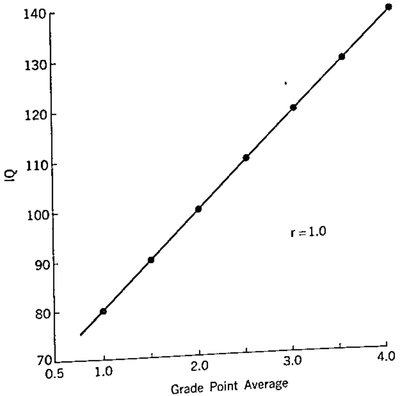



FIGURE 4.5 Hypothetical plot that might be obtained if IQ and grade point averages were perfectly correlated.

ment (as measured by grade point averages) is directly proportional to IQ.

Of course, two given factors are almost never perfectly correlated. A more realistic picture of the relationship between our two variables is shown in Figure 4.4. Here it will be seen that the scores, while forming a definite "directional" trend, do not all fall on the same line. A "line of best fit"[1] has been superimposed on this pattern to show the actual slope of the scattergram pattern. Because all points do not fall exactly on this line, and because the line does not slope at a 45° angle, the correlation is *less than* 1.0, and actually would be about .76. This is still a fairly strong correlation, indicating that there is a strong relationship between the two variables. That is to say, there is a strong tendency for those with high IQ's to attain better grade point averages.

Sometimes two items are related to each other, but in a *negative* direction. There is such an inverse, or negative, relationship between amounts of alcohol consumed and a test of balance (Figure 4.6). In this case a correlation of −.84 indicates strongly that the more alcohol one consumes the more poorly he is apt to score on the balance test.

If there is no correlation between two variables, the correlation coefficient approaches zero as shown in Figure 4.7.

There are other kinds of graphs, but these are the ones most commonly en-

[1]This can be calculated mathematically. There is only one line of best fit for a given set of points.

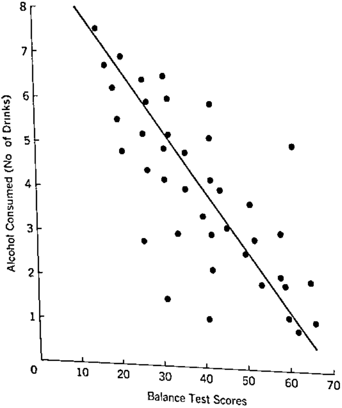



FIGURE 4 6 Hypothetical plot of scores on a balance test and amount of alcohol consumed. Line of best fit indicates a negative correlation.

countered. Sometimes a great many variables are all recorded on the same graph, so that considerable patience is required to determine exactly what is shown by the various curves. Interpretation of these more complex graphs is basically no different, however, from the interpretation of the simple ones just discussed; they merely require a little more study.

It should be pointed out that a high positive or negative correlation is not necessarily indicative of a cause-and-effect relationship. A correlation coefficient can be calculated or portrayed in a plot where two kinds of numerical scores are available, whether or not a real and practical relationship exists between the two measures. The classic example goes something like this: There is a high correlation between the number of storks per month flying over a large city and the number of births per month; this obviously is coincidence, not cause and effect, and does not prove that storks do, after all, bring babies! It may also be that two factors *are* related, not just coincidentally, but from the experimental data we cannot establish which is "cause" and which "effect." Be careful to use some common sense in interpreting correlations.

## CREATIVITY

It is our hope that you will have ample opportunity in your formal college

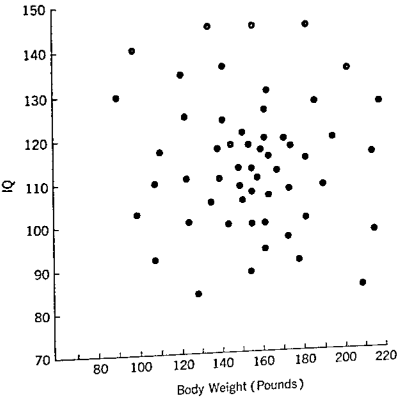



FIGURE 4.7 Hypothetical plot of IQ and body weight. No single line of best fit can be established; no relationship exists between the variables.

education to develop a creative, critical, and systematic approach to your profession. Given that opportunity, some will respond, some will not; some will become professionals, some will not. Of course it takes more than a knowledge of *how* to solve a problem *or how* to conduct an experiment or research project to be the complete professional. One must be alert to the subtle personal needs of the persons with whom one is dealing and to the program needs that *all too often are not very obvious*. One cannot assume that "no news is good news," that "no complaints from administration and no complaints from students" means that a program is sound and effective. This is where it takes a professional, a dedicated person who can and *will* think critically, creatively, and systematically. In other words, one cannot sit back and wait to solve problems that are brought to him. He must, as often as possible, seek them out and initiate solutions before they become any more detrimental to the welfare of the people involved and to the ultimate success of the program. This is part of the "creativity" aspect of the professional's job and is, of course, *directly dependent upon his interest in his program and its participants.*

The concepts presented in this chapter lead logically to a discussion of health and well-being of the individual because the creative and systematic thinking is ultimately directed at im-


FIGURE 4 8 © 1968 United Feature Syndicate.

proving programs so as to promote and improve man's well-being. In the next chapter, we will discuss health and physical fitness concepts as one of the specific and common concerns of health education and recreation.

## SUMMARY

The ability to think systematically, critically, and creatively distinguishes the professional from the technician. He can and should make intelligent decisions.

The professional must be alert to "silent" problems as well as those which have become obvious.

Use of appropriate bar and line graphs provides for better understanding of the data and their interpretation.

## PRINCIPLES

1. The problem-solving or scientific method involves recognition and identification of the problem or question, formulation of a working hypothesis, testing the hypothesis, drawing conclusions and making some kind of decision.

2. There is a basic format for reporting research results which insures that the essential elements are covered and which also facilitates follow-up research by other investigators.

3. A positive or negative correlation or relationship which exists between two variables may mean one of three things:

   a. Nothing—the numerical manipulation provides a high correlation but the basic assumption is in error and thus the correlation is meaningless (example: high correlation between physical fitness and height when sample included ages 6 through 17).

   b. Relationship is meaningful but "cause and effect" is not established (example: high negative correlation between daily activity and degree of obesity in rats; which causes which?)

   c. Relationship is meaningful and "cause and effect" has been established (example: follow-up study to one in (b.) alone indicates that rats forced to exercise daily do not become as obese as those forced to remain sedentary; thus inactivity apparently precedes obesity and not vice versa).

## EXPERIMENTS AND EXPERIENCES

1. List some examples of variables which might be correlated but in a meaningless way.
2. Write up two research reports (one a survey, one an experiment) as follows:
   a. Identify a problem or question which interests you.
   b. State your working hypothesis.
   c. Describe the procedure in careful detail (as though you have carried out the study).
   d. Describe and graph three possible alternative results (two extremes and "nothing").
   e. Draw conclusions based on each of the three alternative results.
   f. Make a decision based on each alternative result.
3. Describe how you might apply the problem-solving method to a theoretical nonexperimental problem in physical education, health education, or recreation.
4. See how many examples of inappropriate use of statistics you can find.
5. Many of the experiments and experiences listed at the end of other chapters will also provide opportunity to develop the scientific, problem-solving techniques of inquiry.

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# Health and Physical Fitness Concepts

## Chapter 5

In order to discuss *health* and *physical fitness*, the status of both, and the means of improving these qualities, we must come to some understanding of what these terms mean. We will operate on the basis of the following definitions, treating these qualities for the moment as though they were separate, distinct, and unrelated qualities (which, in reality, they are not). Health is generally taken to mean "freedom from defect and disease" or, in a more positive sense, "mental and physical well-being" or "soundness of body and mind." Physical fitness, although there are many and varied definitions, each with its own peculiar tangent, is generally taken to mean "the capacity to carry out physical tasks" (especially those tasks requiring considerable muscular effort, which tasks in turn require a well-conditioned neuro-skeleto-muscular system and/or circulo-respiratory system).

We will first take a look at our current health status, then discuss some misconceptions about physical fitness before analyzing current fitness status. We will then direct attention toward the theoretical relationship between health and physical fitness, the effects of regular exercise on health (longevity,

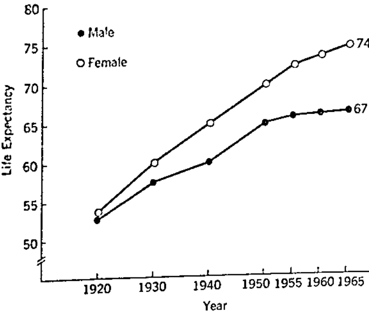


**FIGURE 5.1** Life expectancy for men and women in the United States, 1920-1965. Adapted from *Statistical Abstract of the United States* (578)

resistance to infection, and so on), and, finally, will discuss health appraisal.

## CURRENT HEALTH STATUS

It is difficult to find incontrovertible evidence regarding the actual causes of gross population changes in health status. We can, however, identify relevant facts and figures. These data, coupled with discrete observations and new statistics presented from time to time, can aid in the process of deduction. You can then reach some logical conclusions of your own. These conclusions, in turn, can be interpreted in the light of health needs. Again, we have employed the problem-solving technique: the data are presented in simplified form, thus challenging you and allowing you to reach your own conclusion as to the meaning of each particular table or graph. Study each table and illustration carefully and ask yourself, "What does this imply?" You should be looking for answers to many questions: What are some of the most likely causes of our national health problems? Are automation and overmechanization involved? Do not expect simple answers; in some cases the evidence is conflicting. There are not enough pieces to complete most of these puzzles, but each piece of evidence presented does somehow fit into the larger puzzle; ultimately all conflicts will be explained on the basis of new and better studies. At present, these conflicts are actually good and essential: they promote further and more careful work that will lead to better answers. In some cases, you may be able to resolve and explain an apparent paradox. In any case, you will be armed with more information

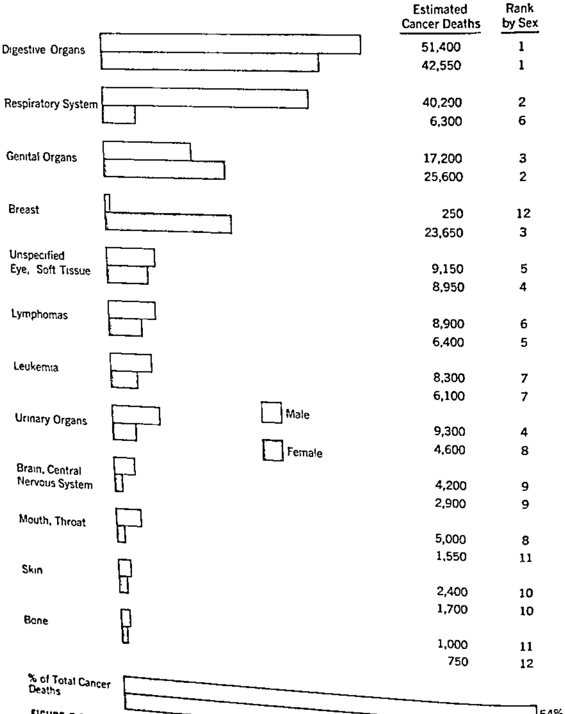


**FIGURE 5.2** Estimated cancer deaths by site and sex, 1964, United States. Data from *Facts on the Major Killing and Crippling Diseases in the United States Today* (172).

with which you can better interpret current and future scientific developments as they are reported, and you should come to a better understanding of our current health status and how it can be improved.

**TABLE 5.1 Selected Causes of Death in the United States, 1900-1965 (Deaths per 100, 000 Population)**

| CAUSE OF DEATH | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 | 1965 |
|---|---|---|---|---|---|---|---|---|
| Major cv—r[a] diseases | 345 | 372 | 365 | 414 | 486 | 511 | 522 | 516 |
| Heart | 132 | 159 | 159 | 206 | 295 | 357 | 369 | 367 |
| Arteriosclerotic heart disease | — | — | — | — | — | 213 | 276 | 287 |
| Cancer | 63 | 76 | 83 | 97 | 120 | 140 | 149 | 154 |
| Influenza and pneumonia | 203 | 162 | 208 | 103 | 80 | 33 | 37 | 32 |
| Diabetes | 10 | 15 | 16 | 19 | 27 | 16 | 17 | 17 |
| Cirrhosis of the liver | 13 | 14 | 7 | 7 | 8 | 9 | 11 | 13 |
| Ulcer | 3 | 4 | 4 | 6 | 7 | 6 | 6 | 5 |
| Tuberculosis | 194 | 154 | 113 | 71 | 46 | 23 | 6 | 4 |
| Bronchitis | 46 | 23 | 13 | 4 | 3 | 2 | 2 | 3 |

[a]Cardiovascular renal

SOURCE: U S Bureau of the Census (578)

**TABLE 5.2 Days of Disability Due to Chronic Disorders, per Year per 100,000 population, United States Average for 1958 and 1959**

| CAUSE | RESTRICTED ACTIVITY | RESTRICTED TO BED | WORK LOSS | SCHOOL LOSS |
|---|---|---|---|---|
| C-v | 269 | 93 | 100 | 6 |
| Digestive | 115 | 42 | 75 | 3 |
| Arth.-rheumatoid | 141 | 36 | 46 | 0 |
| Other | 738 | 236 | 327 | 81 |

SOURCE U S Bureau of the Census (578)

**TABLE 5.3 Average Prevalence of Selected Chronic Conditions, Number per 1000 Population**

| CONDITION | 1957-1959 | 1959-1961 |
|---|---|---|
| Heart disease | 29.5 | 30.2 |
| High blood pressure | 30.8 | 32.3 |
| Ulcer | 14.4 | 15.9 |
| Arth.-rheumatoid | 63.9 | 65.6 |

SOURCE U S Bureau of the Census (578)

TABLE 5.4 Selective Service Statistics, Percent Rejected, World War I through 1965

| | WW I | WW II | 1950-56 | 1958 | 1960 | 1962 | 1963 | 1965 |
|---|---|---|---|---|---|---|---|---|
| Rejected | 21 3 | 35 8 | 33.5 | 41.9 | 44 8 | 49.8 | 50 0 | 44 0 |
| Medical only | – | – | 15 7 | 19 0 | 22.1 | 22.7 | 24 0 | 21 8 |
| Mental only | – | – | 13.6 | 18.0 | 18 8 | 21 5 | 21.6 | 18 6 |
| Both | – | – | 3 1 | 3.3 | 2.9 | 3 0 | 3 1 | 2.3 |

SOURCE U S Bureau of the Census (578).

## HEALTH KNOWLEDGE

No discussion of current health status would be complete without some consideration of what kind of knowledge our population has about matters of health. This leads us to consider the question of medical quackery and old wives' tales. To further acquaint you with the problems associated with the public's lack of health knowledge and wisdom, two excellent articles are reproduced here.

### Health Education vs. Medical Quackery*

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Children learn at an early age that there is a certain amount of dishonesty and fraud in the business world. My 9-year-old son suffered a disappointment bordering on shock when he received a toy he had seen ballyhooed on television. The difference in what he had expected and what he actually got was remarkable indeed. That same youngster has now learned to be wary of the cereal box-top come-ons, after similar disappointments. Come to think of it, he is pretty sophisticated in his small world as a consumer.

Likewise, my teenage son has learned some lessons about gasoline additives to double your mileage and so-called high-powered spark plugs advertised to the high school set. When I was his age, I had no car, but I had freckles. Freckles were not as socially acceptable then as they are now, and I learned a few things about cosmetic advertising after spending several dollars on freckle cream.

If there is any bright side to this kind of experience, perhaps it is simply in the "once burned, twice shy" adage, since such experiences may help to immunize young people against the bigger—and more dangerous—types of fraud they will meet up with as they grow older.

In the health field, we call this kind of fraud and cheating "quackery." The definition is important because by today's usage, quackery refers not only to the quack practitioner but also to the worthless product and the fraudulent promotion.

It is not a life-or-death matter if the teenage debutante does not get the results she expects from a bust developer or an acne

*From the *Journal of Health, Physical Education and Recreation*, 36 28, 1965, by permission of the American Association for Health, Physical Education, and Recreation.

lotion, or if the tanning preparation used before the high school prom leaves her face covered with orange-red splotches a few days later. But it may be a life-or-death matter if a few years later that same young woman discovers a lump in her breast and decides to try out some quack remedy because she is afraid to tell her doctor about it.

The knowledge of how to seek competent medical advice in such a situation, how to evaluate labeling claims and advertising, books used in promotions, articles in magazines, claims of so-called health lecturers and of house-to-house peddlers, and radio and television promotions—such knowledge may in fact be the most important health education message that youngsters can be taught today. I am not going to presume to tell you as professional teachers how to do your job of teaching. But I think you will be interested in some of our material on the subject of health education as it relates to medical quackery.

These are true-life cases from FDA files. For example, consider the outer carton from a package of Nutri-Bio—a vitamin-mineral preparation containing a number of miscellaneous ingredients such as unsaturated fatty acids, bioflavonoid complex, alfalfa juice, and various minerals and trace elements. Back in 1961 and 1962 Nutri-Bio was promoted with labeling statements that "the American people are the most undernourished people in the world even though overfed" and that Nutri-Bio was of special dietary value because the ingredients were of natural or organic origin.

I mention this type of product first because nutritional quackery is an important subject for teachers, and yet a difficult one because of the well-known atrocious dietary habits of teenagers. This is complicated by the fact that children nowadays have been brought up on vitamins (it used to be cod liver oil) and many of us are conditioned to believe that supplementary vitamins and minerals are an absolute must for everyone if he is to enjoy good health. This is not so!

The fact is that food faddism and nutritional quackery rank as the biggest racket in the health field today. This quackery thrives on the major themes of the food faddists—and the willingness of people to believe them. These are:

1. That all diseases are due to faulty diet;
2. That soil depletion and the use of chemical fertilizers cause malnutrition and poison our crops;
3. That modern methods of food processing and cooking have robbed our foods of their nutritional value; and
4. That anyone who has the "tired feeling" or an ache or a pain is probably suffering from a "sub-clinical deficiency" and needs to supplement his diet with some special concoction.

Nothing could be further from the truth. While there are, of course, special circumstances in which dietary supplementation is necessary, advice of a competent physician is needed to identify vitamin or mineral deficiencies and to prescribe their proper treatment.

The promotion of Nutri-Bio a few years ago provided a classic example of food faddism gone wild. More than 75,000 full and part-time sales agents were selling Nutri-Bio at $24.00 per packet for a six-months' supply for one person. The promotion involved one of the largest collections of pseudo-scientific literature and books ever assembled. Nutri-Bio was being recommended as the answer to practically all health problems—anemia, arthritis, cancer, diabetes, heart troubles, nervousness, and so on. It promised health, beauty, athletic ability, radiant living, and the capacity to stay young and vital. It was even recommended as a cure for juvenile delinquency. The sales distribution plan was based on a chain-letter type scheme and many people